NUEXCO

Monthly Report

November 1990 Number 267

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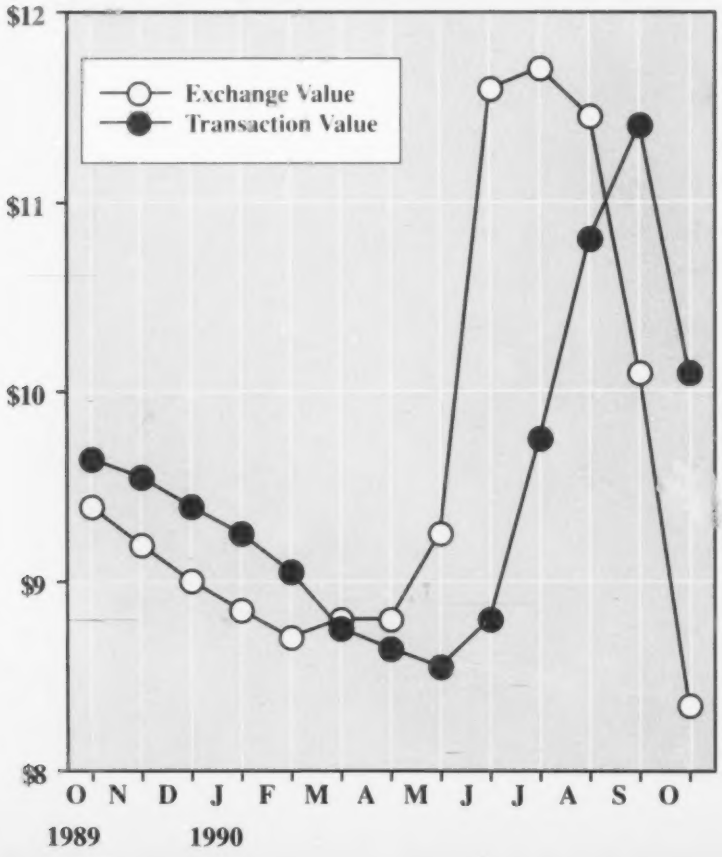

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Other NUEXCO Publications:
Annual Review;
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International Directory of Uranium Producers (IDUP)

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- **Taxation and Regulation of Uranium Mining in Canada**

Government taxation and regulation profoundly influence uranium operations. Mineral rights, licensing, and occupational health and safety are both federally and provincially regulated, sometimes leading to conflicting or overlapping jurisdiction.

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Pribram is one of the largest and richest vein uranium districts in the world, and has accounted for about 60% of Czechoslovakia's total uranium production.

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Exploration activity in Canada is at very low levels, but even so, a new, world-class deposit has been discovered. Work continued on a number of projects, while several mines cutback or closed operations.

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To Our Readers

NUEXCO is proud to report three noteworthy service anniversaries.

Lindy Lindberg — 20 years
Wayne Fowler — 15 years
Jim Vaughan — 15 years

Lindy marked his 20th year with NUEXCO on November 1. In what would be a career for many, Lindy's accomplishment comes on top of 42 years with General Electric. He recently celebrated his 85th birthday and is still active in day to day market activities as NUEXCO's representative to 14 US utilities. We congratulate him on this tremendous achievement.

Wayne celebrated his 15th year with NUEXCO on October 20. Today he is involved with the organization in a managing and advisory capacity to several CONCORD entities.

Jim will complete his 15th year with the company this coming January. A senior vice–president of NUEXCO, he has been in our Geneva, Switzerland office for eight years.

The CONCORD/NUEXCO organization is proud of the achievements of these men and the experience they bring to the company. We congratulate them on their accomplishments.

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Market Values Summary

NUEXCO Market Values	This Report October 31, 1990	Last Report September 30, 1990	12 Months Ago October 31, 1989
EXCHANGE VALUE [1]	**$8.35**/lb equivalent U_3O_8	$10.10	$9.40
UF_6 VALUE [2]	**$24.75**/kg U as UF_6	$29.50	$28.25
LOAN RATE [3]	**3.5%**/annum	3.5%	3.5%
CONVERSION VALUE [4]	**$1.45**/lb U as UF_6	$1.45	$1.80
SWU VALUE [5] **(0.3% tails assay)**	**$51**/SWU	$50	$59
TRANSACTION VALUE [6]	**$10.10**/lb equivalent U_3O_8	$11.40	$9.65
Transactions	12	15	17
Months	3	3	4
Millions of Pounds	2.3	3.7	2.5

DEFINITIONS

1 The **Exchange Value** is NUEXCO's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.

2 The **UF_6 Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the date indicated.

3 The **Loan Rate** is NUEXCO's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.

4 The **Conversion Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.

5 The **SWU Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of enrichment services could be concluded as of the date indicated.

6 The **Transaction Value** is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:

a) Transactions closed within the previous three month period for which delivery is scheduled within one year of the transaction date;

b) At least ten transactions;

c) Transactions involving a sum total of at least 2 million pounds equivalent U_3O_8.

DERIVATIONS AND COMMENTS

- All **Market Values** are expressed in terms of US$.
- All **Market Values** are based on:
  - Data from recently completed transactions.
  - Data from pending transactions.
  - Firm bids to buy or borrow, and firm offers to sell or lend.
  - Prices purchasers or rates borrowers have expressed a willingness to pay, but for which NUEXCO is not aware of firm bids to buy or borrow and prices sellers or rates lenders have expressed a willingness to accept, but for which NUEXCO is not aware of firm offers to sell or lend.
- Prices associated with deliveries under old or renegotiated contracts or other than arm's-length transactions are not included in the determination of these **Market Values**.
- In the determination of prices, NUEXCO does not consider charges for transportation other than that customarily provided by suppliers.
- The prices of services or materials delivered under long-term contracts with primary suppliers are not considered in the determination of the listed values.
- For the **SWU Value**, NUEXCO converts SWU prices at varying tails and product assays to equivalent SWU prices at a tails assay of 0.30 weight percent U^{235} and a product assay of 3.0 weight-percent U^{235}, assuming feed costs corresponding to the NUEXCO **Exchange Value** and **Conversion Value** determined as of the same date.
- In calculating the **Transaction Value**, NUEXCO does not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future **Exchange Values** or any other indeterminate variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it can not currently be determined.
- The sample time for the **Transaction Value** is extended as necessary to satisfy the minima for the number of transactions and quantity of material. Other currencies are converted to US dollars using conversion rates in effect on or near the transaction date.

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OCTOBER MARKET REVIEW

(as of October 31, 1990)

OVERVIEW

Throughout the month, uranium suppliers competed aggressively in a market characterized by ample supply and limited sales opportunities. The Exchange Value and UF_6 Value both registered record decreases. The Exchange Value fell to $8.35 per pound U_3O_8 which, after adjustment for inflation, is its lowest level ever. The UF_6 Value recorded its largest drop ever, falling $4.75, to $24.75 per kgU as UF_6.

Seven near-term uranium sales totalling 1.2 million pounds equivalent U_3O_8 are reported (**Table 1**). Four sales involved concentrates, while the three others involved natural UF_6. No enriched uranium product (EUP) sales are reported. Additionally, three long-term natural uranium sales totalling 3.4 million pounds equivalent U_3O_8 are reported.

The Loan Rate and Conversion Value remain unchanged at 3.5 percent per annum, and $1.45 per pound U as UF_6, respectively. The SWU Value edged upward one dollar, to $51 per SWU. There was one transaction in each of the loan, conversion, and SWU markets. The one loan involved over one million pounds equivalent U_3O_8, and the conversion sale exceeded 300 thousand pounds U. The solitary enrichment sale involved a small quantity of SWU sold at a price near the October 31 SWU Value.

Table 1
NEAR-TERM URANIUM SALES SUMMARY

	October 1990		Year-to-Date	
	No. of Sales	Volume[1]	No. of Sales	Volume[1]
Concentrates	4	0.7	54	20.8
Natural UF_6	3	0.5	30	10.0
EUP	0	0.0	11	4.5
Total	**7**	**1.2**	**95**	**35.3**

[1] million pounds equivalent U_3O_8

NATURAL URANIUM AND CONVERSION

The **Exchange Value** fell to its lowest level ever in constant 1990 dollars, sinking $1.75, to **$8.35** per pound U_3O_8. This 17% decline represents the largest percentage drop in its 22-year history. Offering prices decreased rapidly during the month as sellers competed aggressively for the few sales opportunities, even to the point of contacting buyers after bid deadlines had expired and offering to lower prices further. Market prices fell rapidly both in Europe and North America, but prices tended to be slightly higher in Europe. Offered prices fell quickly, even further than the already reduced levels that prevailed in sales concluded in the latter half of the month. Thus, the October 31 Exchange Value is based primarily on evidence of offers to sell near the $8.35 level as of the end of the month.

The four concentrates sales reported this month total nearly 700 thousand pounds U_3O_8. North American and European market participants were active in October, both as buyers and sellers of concentrates.

As the Exchange Value has fallen to record low levels, traditional market roles have changed; some traditional sellers have become buyers, some traditional buyers have withdrawn from the falling market in anticipation of even lower prices, while other buyers have re-entered the market to make discretionary purchases.

* * *

The **UF_6 Value** continued its precipitous decline, falling sharply to **$24.75** per kgU as UF_6. This $4.75 (16%) tumble marks the second consecutive record drop in the UF_6 Value, both in absolute and percentage terms, since its initial publication on April 30, 1985. The UF_6 market displayed characteristics similar to the concentrates market: limited sales opportunities, abundant supply, low offering prices, and aggressive seller competition. While market price levels continue to decline, by the end of the

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Table 2
NEAR-TERM SUPPLY/DEMAND SUMMARY

	Active Supply [1]	Active Demand [1]
• Natural Uranium [2] (thousand lbs equivalent U_3O_8)	4,375	1,420
• Supply/Demand Ratio:	3.1	
• Loan (thousand lbs equivalent U_3O_8)	9,605	0
• Conversion (thousand lbs U as UF_6)	1,650	210
• SWU (thousand SWUs)	435	208

[1] Supply and demand tables in the current market data section of this Report provide details for each category.
[2] Includes concentrates and hexafluoride.

month their rate of descent seemed to have eased compared to the rate at which prices plummeted during the early and middle weeks of October. However, just as with concentrates, the rapidity of the decrease, combined with the unpredictability of market participants' behavior at these low price levels, makes the market even more complex.

Three spot UF_6 sales are reported. Three US utilities purchased a total of 500 thousand pounds equivalent U_3O_8 for delivery in December of this year. One sale occurred earlier in the month at a price well below the September 30 UF_6 Value, but still above the October 31 UF_6 Value. The other two sales occurred later in the month at price levels near the October 31 UF_6 Value.

* * *

The **Transaction Value** decreased to **$10.10** per pound U_3O_8 based on 12 transactions over 3 months involving 2.3 million pounds equivalent U_3O_8. This $1.30 per pound decline reflects the expected downturn of the Transaction Value as more recent, lower-priced transactions are included in the calculation. The Transaction Value will likely move lower in the coming months as previous higher-priced transactions are displaced by current low–priced sales.

* * *

The **supply/demand ratio** declined to **3.1**, based upon an **active uranium supply** of **4.4** million pounds equivalent U_3O_8 and an **active uranium demand** of **1.4** million pounds. While this change shows an increase in demand and a decrease in supply, plentiful supply assures that expected near-term demand will not only be filled, but will be sought after aggressively by suppliers.

* * *

Long-term uranium market activity increased this month as three utilities purchased material totalling over 3.4 million pounds equivalent U_3O_8. Two of the sales involved concentrates purchased under contracts using market-related pricing terms; the other sale involved natural UF_6. Deliveries in these three sales are to occur between 1991 and 1999.

* * *

The **Loan Rate** remains at **3.5** percent per annum. One loan of natural UF_6 is reported. A utility loaned over one million pounds equivalent U_3O_8 to an intermediary at a rate above the prevailing Loan Rate, in exchange for some special considerations granted to the borrower. Loan supply increased to 9.6 million pounds equivalent U_3O_8 (**Table 2**), while no active inquiries to borrow are reported. The abundance of loan material adds to the oversupply situation and puts extra pressure on suppliers already anxious to complete sales.

* * *

The **Conversion Value** is unchanged at **$1.45** per pound U as UF_6. One conversion transaction is reported. A European utility purchased over 300 thousand pounds U as UF_6 from a primary convertor.

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MARKET REVIEW

ENRICHMENT SERVICES AND ENRICHED URANIUM PRODUCT

The **SWU Value** increased one dollar, to **$51** per SWU, reflecting a slight strengthening of the secondary enrichment market. This is the first change in the SWU Value in nine months and its first increase in 22 months. But longer-term concerns about large stockpiles and increased competition from new and emerging suppliers have heightened worries about any permanent price recovery.

One SWU sale is reported this month in which a utility purchased a small quantity of SWU from an intermediary at a level near the October 31 SWU Value. No EUP sales are reported. ■

Table 3
ENRICHMENT PRICES
(October 31, 1990)

Prices	This Month Report 267	Last Month Report 266	12 Months Ago Report 255
NUEXCO SWU Value ($US per SWU)	51	50	59
US DOE SWU prices: ($US per SWU)			
USEC	117.85[1]	117.85[1]	117.85[1]
AFC	153.00[3]	153.00[3]	153.00[3]
Requirements	157.00[3]	157.00[3]	157.00[3]
Incentive Price (IP2)[4]	100.60[4]	100.60[4]	90.00[5]
Calculated worth of enriched UF_6[6]: ($US per KgU as UF_6)			
2.0 w/o U_{235}	190	207	218
2.5 w/o U_{235}	263	285	303
3.0 w/o U_{235}	339	366	389
3.5 w/o U_{235}	416	447	478
4.0 w/o U_{235}	494	530	568
4.5 w/o U_{235}	573	614	659

[1] Effective 10/1/89 to 9/30/91.
[2] Effective 10/1/87 to 9/30/89.
[3] Effective since 10/1/84.
[4] IP2: Effective 10/1/90 to 9/30/91, for up to 30% of annual requirements.
[5] Uses Incentive Price IP1 – effective 10/1/86 to 9/30/90, for up to 30% of annual requirements.
[6] Calculated using the NUEXCO Exchange Value, Conversion Value, SWU Value and 0.30 w/o tails assay.

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RECENT TRANSACTIONS

Uranium Sales[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U_3O_8)	Price Within Percentage Range[2] of Current Exchange or UF_6 Value	Buyer	Seller	Remarks
4956	1990	Less Than 50	Above 110	Intermediary	Producer	
4958	1991	101-300	103-110	Utility	Intermediary	
4959	1990	50-100	103-110	Utility	Intermediary	UF_6
4961	1990	101-300	Above 110	Producer	Intermediary	
4967	1992-1995	1,001-3,000	**R**	Utility	Producer	UF_6
4968	1992-1994	601-1,000	See Remarks	Utility	Producer	Market Related Pricing
4969	1990	101-300	98-102	Utility	**R**	UF_6
4971	1991-1995	1,001-3,000	See Remarks	Utility	Intermediary	Market Related Pricing
4972	1991	101-300	102-110	Utility	Intermediary	
4973	1990	101-300	98-102	Utility	Converter	UF_6

R means that NUEXCO either does not know, or that NUEXCO has restricted that information to protect client or source confidentiality.

[1] Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.

[2] The ranges *Below 90, 90-97, 98-102, 103-110, Above 110*, represent percentages (rounded to whole numbers) of the appropriate current Exchange Value or UF_6 Value. The endpoints of each range are included within that range.

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MARKET REVIEW

RECENT TRANSACTIONS

Natural Uranium Loans [1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U_3O_8s)	Price Within Percentage Range [2] of Current Loan Rate	Borrower	Lender	Remarks
4962	1990	1,001-3,000	Above 110	Intermediary	Utility	UF_6

Conversion Sales [1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds of U equivalent)	Price Within Percentage Range [2] of Current Conversion Value	Buyer	Seller	Remarks
4970	1991-1992	301-600	R	Utility	Converter	

Enrichment Sales [1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity [3] (thousand SWU)	Price Within Percentage Range [2] of Current SWU Value [4]	Buyer	Seller	Remarks
4960	1990	Less Than 50	98-102	Utility	Intermediary	

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2 The ranges *Below 90, 90-97, 98-102, 103-110, Above 110*, represent percentages (rounded to whole numbers) of the appropriate current Market Value. The endpoints of each range are included within that range.

3 If tails assay is unknown or unspecified, NUEXCO's calculation of SWU quantity assumes 0.30 w/o tails assay.

4 Prices are usually normalized to 0.30 w/o tails assay. When prices and SWU values are expressed as discounts from a reference price (e.g., X dollars less than DOE's USEC base price at time of delivery), the percentage price range is based on the discounted prices, not on the reference price.

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SUPPLY AND DEMAND

Uranium Supply

NUEXCO Project Number	Quantity (Thousand Pounds equivalent U_3O_8) Spot or Near-term[1]	Intermediate or Long-term[2]	Delivery Period	Remarks
Available for Sale				
ACTIVE				
90-1078A	2,175	2,175 per year	1991-1993	UF_6e
90-1231*	500	500 per year	1990-1995	
90-1249*	700	—	1990-1991	
90-7001	1,000	1,000 per year	1991-1995	
Total	**4,375**			
INACTIVE	**2,350**			
Available for Loan				
ACTIVE				
88-1182*	4,400	—	—	U_3O_8/UF_6
90-1016*	1,000	—	—	U_3O_8
90-1108	1,000	—	—	U_3O_8
90-1180	525	—	—	U_3O_8
90-1208*	280	—	—	UF_6
90-1212	400	—	—	U_3O_8
90-1230	1,000	—	—	U_3O_8
90-1260*	1,000	—	—	UF_6
Total	**9,605**			
INACTIVE	**1,000**			

*New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: 90-1227.
Active Projects removed since last month: 89-1001, 90-1033, 90-1110.

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MARKET REVIEW

SUPPLY AND DEMAND

Uranium Demand

NUEXCO Project Number	Quantity (Thousand Pounds equivalent U_3O_8) Spot or Near-term [1]	Intermediate or Long-term [2]	Delivery Period	Remarks
Inquiries to Purchase:				
ACTIVE				
90-1100A	45	—	1991	UF_6e
90-1182	25	—	1991	
90-1229	200	—	1991	
90-1235*	750	—	1991	
90-1258*	100	—	1990	
90-1262*	300	—	1990	
90-1170	—	290	1992-1996	
90-1205	—	260 per year	1992-2001	UF_6
90-1206	—	390 per year	1993-2001	UF_6
90-1226*	—	1,045 per year	1992-1996	UF_6
90-1240*	—	260 per year	1994-1996	U_3O_8/UF_6
90-1241*	—	130 per year	1992-1997	UF_6
90-1254A*	—	250 per year	1993-1996	U_3O_8/UF_6
90-1255*	—	260 per year	1993-2001	UF_6
90-1256*	—	500 per year	1994-1998	U_3O_8/UF_6
Total	**1,420**			
INACTIVE	**1,975**			
Inquiries to Borrow	*No inquiries to borrow are reported*			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*
Active Projects removed since last month: 90-1098, 90-1155, 90-1207, 90-1209, 90-1210, 90-1215.

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SUPPLY AND DEMAND

Conversion Supply And Demand

NUEXCO Project Number	Quantity (Thousand Pounds U as UF6) Within 3 Years[1]	Beyond 3 Years[1]	Remarks
Available for Sale			
ACTIVE			
90-1261*	1,650	—	1991
Total	**1,650**		
INACTIVE	*None reported*		
Inquiries to Purchase			
ACTIVE			
90-1259*	210	—	1991
90-1254C*	—	210	1993-1996
Total	**210**		
INACTIVE	*None reported*		

* New or revised since last month.

[1] Measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*
Active Projects removed since last month: 90-1184, 90-1214.

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SUPPLY AND DEMAND

SWU Supply And Demand

NUEXCO Project Number	Quantity (Thousand SWUs) Spot or Near-term [1]	Quantity (Thousand SWUs) Intermediate or Long-term [2]	Delivery Period	Remarks
Available for Sale				
ACTIVE				
90-1078B	435	435 per year	1991-1993	UF6e
90-7000	—	1,000	1991 on	
Total	**435**			
INACTIVE	*None reported*			
Inquiries to Purchase				
ACTIVE				
90-1100B	15	—	1991	UF6e
90-1224*	40	100 per year	1991-1995	
90-1225	150	—	1991	
90-1251*	3	—	1991	
88-1061	—	500	1991-1995	
90-1076	—	350 per year	1992-1998	
90-1094	—	500	1992-2000	
90-1144	—	60 per year	1992-2001	
90-1181	—	600	1996-2003	UF6e
90-1196	—	60 per year	1995 on	
Total	**208**			
INACTIVE	**155**			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes SWU deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*

Active Projects removed since last month: *none*

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MARKET VALUES EXPRESSED IN SELECTED CURRENCIES

Exchange Value[1]

Country (currency)	per lb equivalent U_3O_8 as Concentrates			per kg U as Concentrates		
	This Month (Oct. 31, 1990)	Last Month (Sept. 30, 1990)	12 Months Ago (Oct. 31, 1989)	This Month (Oct. 31, 1990)	Last Month (Sept. 30, 1990)	12 Months Ago (Oct. 31, 1989)
Australia (dollar)	10.65	12.22	12.01	27.69	31.77	31.21
Belgium (franc)	260.12	324.55	362.24	676.27	843.76	941.73
Canada (dollar)	9.74	11.67	11.03	25.33	30.33	28.68
EEC (ecu)	6.16	7.69	8.42	16.02	19.99	21.89
Finland (markka)	30.06	37.37	39.93	78.15	97.15	103.81
France (franc)	42.29	52.73	58.57	109.95	137.09	152.26
Germany (mark)	12.63	15.77	17.25	32.85	40.99	44.84
Italy (lira)	9,465	11,796	12,663	24,607	30,668	32,922
Japan (yen)	1,075	1,393	1,334	2,794	3,622	3,468
Netherlands (guilder)	14.24	17.77	19.47	37.03	46.20	50.61
So. Africa (comm. rand)	21.26	25.96	24.73	55.28	67.50	64.29
Spain (peseta)	791.54	986.81	1,098	2,058	2,565	2,855
Sweden (krona)	46.91	58.01	60.22	121.96	150.82	156.55
Switzerland (franc)	10.70	13.06	15.10	27.81	33.96	39.25
UK (pound)	4.27	5.37	5.94	11.11	13.97	15.45
US (dollar)	8.35	10.10	9.40	21.71	26.26	24.44

Transaction Value[1]

Country (currency)	per lb equivalent U_3O_8 as Concentrates			per kg U as Concentrates		
	This Month (Oct. 31, 1990)	Last Month (Sept. 30, 1990)	12 Months Ago (Oct. 31, 1989)	This Month (Oct. 31, 1990)	Last Month (Sept. 30, 1990)	12 Months Ago (Oct. 31, 1989)
Australia (dollar)	12.88	13.79	12.32	33.49	35.86	32.04
Belgium (franc)	314.64	366.32	371.87	818.00	952.36	966.78
Canada (dollar)	11.79	13.17	11.32	30.64	34.23	29.44
EEC (ecu)	7.45	8.68	8.64	19.38	22.56	22.47
Finland (markka)	36.36	42.18	40.99	94.53	109.66	106.58
France (franc)	51.16	59.52	60.12	133.00	154.74	156.31
Germany (mark)	15.28	17.80	17.71	39.73	46.27	46.03
Italy (lira)	11,449	13,315	13,000	29,764	34,615	33,797
Japan (yen)	1,300	1,573	1,369	3,379	4,088	3,560
Netherlands (guilder)	17.23	20.06	19.99	44.79	52.15	51.96
So. Africa (comm. rand)	25.72	29.31	25.39	66.86	76.19	66.00
Spain (peseta)	957.44	1,114	1,127	2,489	2,896	2,930
Sweden (krona)	56.74	65.48	61.82	147.52	170.23	160.72
Switzerland (franc)	12.94	14.75	15.50	33.64	38.34	40.30
UK (pound)	5.17	6.06	6.10	13.43	15.77	15.86
US (dollar)	10.10	11.40	9.65	26.26	29.64	25.09

[1] Calculated using currency exchange rates published in *The Wall Street Journal* on the last working day of the month.

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MARKET REVIEW

MARKET VALUES EXPRESSED IN SELECTED CURRENCIES

Conversion Value[1]

Country (currency)	per lb U as UF_6			per kg U as UF_6		
	This Month (Oct. 31, 1990)	Last Month (Sept. 30, 1990)	12 Months Ago (Oct. 31, 1989)	This Month (Oct. 31, 1990)	Last Month (Sept. 30, 1990)	12 Months Ago (Oct. 31, 1989)
Australia (dollar)	1.85	1.75	2.30	4.08	3.87	5.07
Belgium (franc)	45.17	46.49	69.36	99.59	102.72	152.92
Canada (dollar)	1.69	1.67	2.11	3.73	3.69	4.66
EEC (ecu)	1.07	1.10	1.61	2.36	2.43	3.55
Finland (markka)	5.22	5.37	7.65	11.51	11.83	16.86
France (franc)	7.34	7.57	11.21	16.19	16.69	24.72
Germany (mark)	2.19	2.26	3.30	4.84	4.99	7.28
Italy (lira)	1,646	1,694	2,425	3,624	3,734	5,346
Japan (yen)	186.62	200.03	255.43	411.42	440.99	563.12
Netherlands (guilder)	2.47	2.55	3.73	5.45	5.63	8.22
So. Africa (comm. rand)	3.69	3.73	4.74	8.14	8.22	10.44
Spain (peseta)	137.45	141.67	210.26	303.03	312.33	463.53
Sweden (krona)	8.15	8.33	11.53	17.96	18.36	25.42
Switzerland (franc)	1.86	1.88	2.89	4.10	4.13	6.37
UK (pound)	0.74	0.77	1.14	1.64	1.70	2.51
US (dollar)	1.45	1.45	1.80	3.20	3.20	3.97

SWU Value And UF_6 Value[1]

Country (currency)	SWU Value at 0.30 w/o Tails Assay			UF_6 Value per kg U as UF_6		
	This Month (Oct. 31, 1990)	Last Month (Sept. 30, 1990)	12 Months Ago (Oct. 31, 1989)	This Month (Oct. 31, 1990)	Last Month (Sept. 30, 1990)	12 Months Ago (Oct. 31, 1989)
Australia (dollar)	65.05	60.50	75.35	31.57	35.69	36.07
Belgium (franc)	1,589	1,607	2,274	771.03	947.94	1,089
Canada (dollar)	59.52	57.75	69.24	28.88	34.07	33.15
EEC (ecu)	37.64	38.06	52.84	18.27	22.45	25.29
Finland (markka)	183.60	185.00	250.64	89.10	109.15	120.00
France (franc)	258.32	261.06	367.60	125.36	154.02	176.01
Germany (mark)	77.17	78.05	108.26	37.45	46.05	51.83
Italy (lira)	57,810	58,398	79,483	28,055	34,455	38,057
Japan (yen)	6,564	6,898	8,372	3,185	4,070	4,009
Netherlands (guilder)	87.00	87.98	122.20	42.22	51.91	58.51
So. Africa (comm. rand)	129.87	128.53	155.22	63.03	75.84	74.32
Spain (peseta)	4,835	4,885	6,892	2,346	2,882	3,300
Sweden (krona)	286.52	287.19	377.96	139.04	169.44	180.97
Switzerland (franc)	65.33	64.67	94.76	31.71	38.16	45.37
UK (pound)	26.09	26.60	37.31	12.66	15.69	17.86
US (dollar)	51.00	50.00	59.00	24.75	29.50	28.25

[1]Calculated using currency exchange rates published in *The Wall Street Journal* on the last working day of the month.

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RECENT DEVELOPMENTS

Japan

1990 REPORT ON ATOMIC ENERGY

In October, the Japanese government released its annual report on the status of nuclear power and the government's position on nuclear power's future. The following are some of its most interesting points, edited from an English-language summary.

The World Energy Situation

- World energy demand will continue to grow steadily. Demand of developing countries will increase markedly.
- Conditions in the world oil market are feared to worsen, and a continuing increase in the world's dependence on OPEC oil is expected.
- The Japanese government recognizes the international appeals for concerted efforts to be made on the world's environmental issues, particularly the greenhouse effect.
- Because of the continuing growth in energy demand, the dependence on oil from the volatile Middle East, and the increasing international concern over environmental issues, there is every reason to believe nuclear power will continue to occupy an important position as a world energy source.

Nuclear Power Generation Trends in Japan

- Domestic energy demands, particularly for electricity, have been growing steadily.
- Japan is facing a crisis in energy supply and demand, as exemplified by increasing prices of oil from the Middle East, and big summer increases in electrical demand.
- Future dependence on non-fossil fuels should be increased. Domestic nuclear power should generate 50,500,000 kWe in 2000, and 72,500,000 kWe by 2010.
- A program to respond to environmental problems (titled: Action Program to Prevent Greenhouse Effects) is in the planning stage.
- As a result of the recent energy situation, the importance of nuclear power is increasing significantly. Therefore, there is a need to steadily carry out nuclear development and utilization.

Safety Assurance and Public Understanding

- To foster the public's trust in the safety of nuclear power, there is a need to accumulate practical evidence of safety assurance. This will certainly require:
  - — thorough inquiries into the causes of problems;
  - — timely, official announcements of the inquiries' results
- Positive public awareness about nuclear power safety is enhanced by publicity activities and public dialogue. Industry must make a maximum effort to provide the public with accurate and easily-understood information.

Completing the Nuclear Fuel Cycle in Japan

- Because recycled fuel is a semi-domestic energy source, and the control and disposal of nuclear waste is feasible when the waste is in a compact form, it is imperative to develop a reprocessing-recycling system. Japan must strengthen its technological foundation for this system.
- Besides the research efforts in the development of practical fast-breeder reactors, research efforts are progressing on the utilization of plutonium in light-water reactors (LWR). The use of proper containment methods, and current radiation-control technologies are what make the use of plutonium LWRs feasible. By the middle of this century, the development of the practical use of plutonium in LWRs should be completed.
- The transportation of plutonium from overseas reprocessing facilities will be necessary in 1993.
- Low-level radioactive waste will be contained in cement, and then buried underground.
- High-level radioactive waste will be vitrified, then stored for 30-50 years until cool, and then buried several hundred meters underground.
- The programs for the reprocessing of spent fuel as that relates to the Non-Proliferation Treaty concerns other countries. Japan must make a particular effort to elicit the understanding of these countries, with respect to Japan's commitment to the safe and secure handling of plutonium, and its use solely for peaceful purposes. □

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RECENT DEVELOPMENTS

Australia

Recent Events Suggest Possible Policy Change

Recent events in Australia have led to a growing expectation of the likelihood of changes in, or a more flexible interpretation of, the federal government's uranium policy, particularly its three mines policy. These events include: the announcement by the Industry Commission of its finding that "development of uranium mines in Australia should be a matter for commercial decisions." The Commission, which is the government's main advisor on micro-economic reform matters, stated that it was hard to find any clear rationale for the three mines policy, and that there were "no persuasive reasons why other uranium mines could not operate under the strict environmental controls and safeguards which currently apply to existing Australian operations and exports."

Second, the aggregate purchase, by three ERA shareholders (North Broken Hill Peko Ltd., Cogema, and Rheinbraun) of more than 31 percent of Pancontinental Mining Ltd. This is seen as a strategic move designed to position ERA so that, following any change in government's uranium policy, it could pressure Pancontinental to sell or share control of its huge Jabiluka deposit which is located near ERA's existing Ranger operation.

Third, Mrs. Ros Kelly, the government's Minister for the Environment garnered extensive headlines and surprised many when she indicated that, provided that strict environmental standards were met, she could support mining, including uranium mining, even in such environmentally sensitive areas as the Northern Territory's Kakadu National Park. In an apparent bow to reality, Mrs. Kelly said Australians needed to face the fact that their "country is based to a great degree on resource development."

Only time will tell if these events were precursors of change or spurious occurrences. ■

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WASHINGTON FOCUS

The 101st Congress finally adjourned on October 28th after passing a deficit reduction package and a budget for FY 1991, as well as a Clean Air bill. The utility industry was an easy target for Congressional fundraising, and as a result of these new laws, utilities will be required to pay increased user fees and taxes, and incur additional expenses to meet new emission control requirements. The uranium enrichment restructuring bill was attached to the Senate version of the deficit reduction legislation, but was not included in the final bill.

House Uranium Enrichment Restructuring Hearing

◇ Uranium enrichment issues were discussed for much of the month. The House Science, Space & Technology Committee held a hearing on October 11th. The National Taxpayers Union (NTU) held a press conference prior to the hearing which received considerable media coverage. Consequently, more attention has been focused on this issue in the House than it has received in the past. Unfortunately, NTU's message is that DOE's request for legislation to permit the restructuring of the uranium enrichment program is a taxpayer subsidy similar to the bailout of the S&L industry. The NTU asserts because of unknown financial risks such as the expense of D&D and environmental clean-up of the GDPs, along with the risks of deploying a new technology (AVLIS), the restructuring of DOE's program into a government corporation should not be permitted. Rep. Marilyn Lloyd (D-TN), as well as several other witnesses, pointed to the recent contract between the Yankee utilities and the Soviets for enrichment services as a primary reason for Congress to allow DOE to restructure in order to help preserve their US marketshare. Chairman Robert Roe (D-NJ) concluded the hearing with the comment that educating the members of the House of Representatives on the urgency of the issue, in order to move this bill, should be the priority of industry and DOE in the next session.

Enrichment Bill on Budget Reconciliation

◇ Toward the end of the month, there was some hope that Congress would pass enrichment restructuring legislation this year. Senator Wendell Ford (D–KY) attached S 83 to several unrelated bills, but was not successful, then he amended S 83 to the budget reconciliation bill. In order to gain Senate Budget committee approval for this amendment, S 83 had to be ruled as a revenue raiser and not a revenue loss for the Treasury for the FY91–95 period. The committee's solution to raise $500 million over five years was to add a 0.2 mill/kWh fee to pay for D&D of the GDPs. A conference committee consisting of five Senators and nine Representatives (from the energy committees) met to discuss the issue. A number of alternatives were discussed, but none were satisfactory to a majority of the House members. Consequently, S 83 was removed from the budget reconciliation bill, but only after Sen. Ford won a concession from Rep. Philip Sharp (D-IN) that his committee will hold a hearing on an enrichment restructuring bill in the first quarter of next year.

Energy Appropriations Bill

◇ In addition to the budget bill, which determines the overall guidelines for government spending, Congress also passed 13 appropriations bills, which allocate the funds within each category to the individual programs. HR 5019, which authorizes spending for energy programs, passed Congress on October 19, although the President has not yet signed the bill into law. DOE's uranium enrichment program received $1.34 billion based on anticipated revenue of $1.45 billion and

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permission to spend $154.5 million on AVLIS. (See the NUEXCO August Monthly Report #264, p.16 for more information). Congress also authorized DOE's reprogramming request, allowing $16 million of the uranium enrichment funds to be transferred to accounts for the restart of Savannah River, and certification of advanced reactor designs.

Overall, Congress was generous with nuclear programs funding. The $20 billion energy appropriations bill contains a 20% increase in funding for civilian advanced reactor programs, funding to keep the Fast Flux Test facility operating, $20 million for the integral fast reactor program, and $3 million for a demonstration project for Sacramento Municipal Utility District to develop spent nuclear fuel dual-use storage casks. The industry was not so fortunate with the NRC appropriation. Congress appropriated $465 million, $10 million less than the NRC requested, and raised user fees to 100% of the budget for the next 5 years; after 1995, the budget returns to its statutory 33% user fee. For an individual utility, this raised fee means an increase from approximately $1.2 million per reactor to $3.6 million per reactor through 1995.

Clean Air Legislation

◇ Congress also enacted clean air legislation which could cost industry and consumers an additional $25 billion per year by 2000. Two areas will affect the nuclear fuel cycle—the acid rain and the air toxic sections. The final bill (which is similar to the Senate-passed bill), through the efforts of Sen. Simpson, attempts to help the industry end dual regulation from the EPA and NRC. The EPA will proceed with its National Emissions Standards for Hazardous Air Pollutants (NESHAPS) rulemaking, and, after two years, the nuclear industry can petition EPA to ask that only NRC regulations govern nuclear facilities. If the industry demonstrates that the NRC rules protect the public's health and safety adequately, then the nuclear industry will not be regulated by EPA any longer. The problem is there is no limit on how long the EPA can consider the petition, so the industry could be litigating or in limbo for a period of time. The issue of the states' authority to implement stricter standards than federal standards was not resolved, and thus states, such as Massachusetts, are free to set stricter standards. Regarding uranium regulation in the new bill, companies are still analyzing the legislative language to determine if there is some assistance in a savings clause which would allow underground and surface mines to follow the regulations specified under the original Clean Air Act, and not the stricter standards imposed by the new bill. Uranium miners were particularly concerned with whether subparts T and W, which regulate radon flux rates from mill tailings ponds, are subject to this savings clause.

The acid rain provisions of the bill also affect DOE's enrichment facilities. The three plants which provide power to the GDPs had been exempt from using emission trading credits in the House bill, but were included in the final bill. The bargain between the House and the Senate gives midwestern utilities more credits to ease the expense of installing scrubbers and switching to low-sulfur coal. The legislation also allows utilities that plan to install scrubbers two additional years (until 1997) to meet the Phase I standards for SOx and NOx emission reductions. DOE's earlier analysis that acid rain legislation will increase SWU costs by about $15/SWU would seem accurate, as the final bill is very similar to the conditions DOE considered in its analysis. The only unknown factor is how much DOE will benefit from the utilities' cost reduction derived from trading emission credits.

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LES Licensing Amendment

◇ One final piece of legislative business regarding the licensing process for enrichment facilities was completed on October 27th. Ironically, an amendment to Public Utilities Regulatory Policy Act (PURPA, HR 4808), which Rep. Sharp sponsored, was held up by Sen. Ford because of Rep. Sharp's unwillingness to negotiate about the uranium enrichment legislation. Louisiana Energy Services (LES) licensing amendment was attached to this bill. This amendment will allow the NRC to license enrichment plants under 10 CFR Parts 40 and 70, rather than Part 50 (materials handling facilities, rather than production reactor regulations). Several changes were made to the original ammendment; an environmental impact statement must be prepared, and one full adjudicatory hearing must be held prior to construction before a license may be granted. The changes are not significant enough to alter the one-step licensing process, but should help alleviate the concerns of the public and the environmentalists about their participation in the process. The NRC has already approved changes to 10 CFR Part 74, to require materials control and accounting at uranium enrichment facilities. The proposed rule should be published in the Federal Register early in November for public comment. The rule will apply to all enrichment facilities, such as an AVLIS facility, and not just to LES. LES indicated that Duke Engineering and Fluor Daniel have been working on the license application and believe their schedule for early 1991 submittal of the license application will not be affected by the Congressional action.

Other Legislation

◇ Congress also raised customs user fees, and passed a hazardous materials transportation bill that strengthens safety requirements for transportation of hazardous and radioactive materials.

Although none of the legislation described in this article has yet been signed into law by President Bush, he is unlikely to veto any of the bills. Considered as a whole, the 101st Congress, while waiting until the last possible moment, has tapped a new money trough, causing financial damage to the pocketbook of nuclear utilities and their ratepayers. ■

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RECENT DEVELOPMENTS

INDUSTRY BRIEFS

President Bush Signs Radiation Victim Compensation Act

President Bush signed into law the legislation that allows victims of radiation from the US nuclear defense programs to receive up to $50,000 compensation. The $100 million fund is for many individuals who lived near Nevada defense sites, and for miners producing uranium for the government's defense programs, in the 1940s to 1960s and who contracted any of 12 types of cancer known to be associated with materials used in nuclear defense programs.

✦✦✦

Japan Nuclear Fuel Completes Construction Of Rokkasho Enrichment Plant.

Japan Nuclear Fuel (JNF) recently completed the construction of a centrifuge enrichment plant at Rokkasho, at the northern tip of Honshu, Japan's largest island. The plant is scheduled to begin operation in late 1991, at an initial capacity of 150 tons of enriched uranium per year. JNF plans to expand the plant's capacity to 600 tons by 1994. The Japanese government is expected to invest as much as US$1.2 billion in the plant, for research and other projects.

Japanese Vapor Laser Achieves 5% Enrichment

The Japan Atomic Energy Research Institute (JAERI) announced in September that its new experimental vapor laser enrichment test project has achieved a 5% enrichment with an efficiency of 0.004 SWU/kWh, which is only about 10% of the SWU/kWh required for typical gaseous diffusion plants. JAERI stated that the test results confirm the commercial feasibility of the process, and that it expects to later achieve a 65% or better U^{235} recovery rate. JAERI's vapor laser process vaporizes the feed uranium in a vacuum chamber with electron beam guns, ionizes the U^{235} with a dye laser, then recovers the U^{235} electro-magnetically. The Laser Atomic Separation Engineering Research Association is proceeding with a production scale experiment, based on JAERI's test results.

✦✦✦

US To Cooperate With Hungary and Czechoslovakia On Nuclear Power

US, Hungarian, and Czechoslovakian officials, in a September meeting in Vienna, Austria, agreed to cooperate in the safe and peaceful uses of nuclear power. The agreements, if approved in interagency review and the US Congress, will permit US nuclear equipment vendors to supply substantially more equipment to those countries than was previously allowed.

Soviet Union May Reopen Nuclear Station In Armenia, Despite Earthquake Concerns

A nuclear power station in the Armenian region of the Soviet Union may be reopened to help protect the region against critical electrical shortages this winter. The post-Chernobyl, anti-nuclear reaction in the country has halted or slowed virtually all nuclear power plant construction. Additionally, many nuclear plant workers have left their jobs since the Chernobyl accident, leaving many plants severely understaffed. The Armenian power plant was shutdown earlier in 1990, after the public expressed concern over the potential risk of earthquakes damaging the plant.

✦✦✦

Japan's Kashiwazaki Kariwa–2 Begins Commercial Operation

On September 28, Tokyo Electric Power Company (TEPCO) brought its 13th nuclear power unit, the 1,045 MWe (net) BWR Kashiwazaki Kariwa-2, into commercial operation. Japan's 39th commercial nuclear power unit brings the country's installed nuclear capacity to 30,341 MWe (net). Construction began in October 1983, with Toshiba as the primary equipment contractor.

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TAXATION AND REGULATION OF URANIUM MINING IN CANADA

Government taxation and regulation have a profound influence on mineral operations. In Canada, taxation occurs both on the federal and provincial levels. In addition, both federal and provincial regulations also affect mine operations, sometimes with overlapping, or conflicting, legislation and jurisdiction. Three broad areas of regulation affect the mine production of uranium in Canada: 1) mining law or mineral rights; 2) the licensing procedures; and 3) regulation of occupational health and safety.

TAXATION

Mining in general, and uranium mining in particular, make a substantial contribution to the economy of Canada. This contribution is recognized by the Canadian government, which has been very supportive of the mining industry and has actively encouraged its continued development through direct financial aid, attractive financing, tax credits, and other incentive programs. Provincial governments have generally been supportive, but at times, have adopted restrictive policies that conflicted with federal regulations, and as a result, have inhibited the growth of the uranium mining industry.

Federal taxation of mineral production has its roots in the British North American (BNA) Act of 1867, which retained for the government all of the rights for gold and silver deposits. These rights were later extended to include coal and other minerals. In 1930, mineral rights were ceded to the provinces of Alberta, Manitoba, and Saskatchewan. Each province now owns the Crown mineral rights within its geographical area, with certain exceptions, such as Indian reserve lands and federal parks, where mineral rights are held by the federal government.

In 1946, the federal government passed the Atomic Energy Control Act (AEC). This act defined uranium as a strategic material, and, based upon a clause from the BNA Act of 1867, the federal government claimed control of all use of uranium in the national interests of Canada. The AEC act also established the Atomic Energy Control Board (AECB) to administer the AEC Act, and to regulate all aspects of uranium mining, production, transportation, refining, and end use. Conflicts between federal and provincial jurisdiction arise from the fact that while the provinces own the Crown mineral rights and have jurisdiction over the exploitation of all mineral resources (including uranium), the federal government controls the use of uranium.

Federal Taxation

Federal taxation on Canadian mining companies is limited to a corporate income tax, which makes provisions for: 1) acquisition, exploration, and development expenditures; 2) capital costs, and; 3) a resource allowance for provincial taxation and royalties. The present tax rate applicable to resource companies is 28%, a reduction from the previous rate of 46% (effectively 36% after a provincial abatement of 10%). A federal surtax of 3% on corporate income taxes is scheduled for revision, but has not yet been changed.

Before 1974, provincial mining taxes and royalties were fully deductible for corporate income tax purposes. Since then, those deductions have been disallowed, and resource companies have only been allowed to deduct 25% of specified resource profits as a resource allowance. Interest on development capital is also deductible.

Table 1
PROVINCIAL CORPORATE INCOME TAX RATES

Province	Percent *
Alberta	11
British Columbia	16
Manitoba	17
New Brunswick	15
Newfoundland	16
Nova Scotia	15
Ontario	15.5
Prince Edward Island	10
Quebec	13
Saskatchewan	15
Northwest Territories	10
Yukon	10

* Most provinces have lower rates for smaller firms.

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Provincial Taxation

Provincial governments assess resource corporations by two primary means; income taxes and royalties (also called mining taxes). Income taxes were once uniformly and conveniently set at 10% of corporate income. However many provinces have now departed from that system by implementing their own provincial income tax schedule. **Table 1** lists the provincial corporate income tax rates that were imposed starting in 1986.

Mining taxes or royalties are the other primary means of provincial income from resource companies. The term "royalty" came into use by most provinces to circumvent a federal government ruling that at one time disallowed the deduction of "mining taxes" on federal tax forms. Although neither mining taxes nor royalties are now deductible, the term royalty is still used when assessing mineral production in all but four provinces. Each province has its own specific mining tax or royalty legislation, often with particular provisions that are unique to the province. For example, Ontario uses a mining tax that contains several provisions such as an automatic depletion allowance (being phased out), an increasing resource allowance (being phased in), special incentives to encourage processing industries to locate in Ontario, and some accelerated depreciation schedules. Quebec permits an investment allowance of 33% of the cost of new processing assets (up to a maximum of one-third of mining profits). Saskatchewan has a "social capital" cost allowance equal to 30% of the declining balance of social capital expenditures, such as residential or community facilities or services. It also allows an additional credit against royalty payments, equal to 35% of any eligible exploration expense, provided that the expense has not already been claimed as production or pre-production costs.

Saskatchewan is the only province that imposes a specific royalty system for uranium. It is comprised of two tiers; first, a flat ad valorem royalty of 5% of gross sales that may be used as a credit against the profit-related royalties. The second tier is a graduated scale of profit-related royalties levied against the profit per kilogram of annual production. This newly-revised system was just announced in July 1990, and is retroactive to July 1, 1989. **Table 2** compares the old and new royalty systems for

Table 2
SASKATCHEWAN URANIUM ROYALTY SYSTEM

Old Royalty System
(introduced 1976, revised 1980)

- 5% royalty on gross sales (up from 3% in 1988). Can be reduced by 1% with a Saskatchewan resource credit.
- Profit-related royalty—increases as return on investment (ROI)increases.

ROI * (percent)	Royalty in range (percent of profit)
0–15%	0%
15–25%	15%
25–45%	30%
45+ %	50%

- Once royalty was calculated, an additional credit could be deducted equal to 35% of any eligible exploration expenditure which was not already deducted as a qualifying initial capital investment.

* ROI is calculated as operating profit/capital investment at time of production.

New Royalty System
(retroactive to July 1, 1989)

- 5% royalty on gross sales—regardless of profitability. Used as a credit against profit-related royalty payable.
- Profit-related royalty scale—increases as profit per kilogram increases. Just as old system, royalties are payable at each step and are added progressively to determine the total royalty due.

Profit * (Cdn $ per kg)	Royalty Due (percent of profit)
$ 0–2	0%
$ 2–20	15%
$ 20–50	34%
$ 50+	50%

- New system recognizes actual reclamation expenditures among joint venture partners, as opposed to old system which allocated expenditures in strict accordance with percent of ownership of the mineral lease.

* Range limits are annually adjusted for inflation to avoid "bracket creep."

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Table 3
URANIUM ROYALTIES PAID IN SASKATCHEWAN
1976–1988

Year	Uranium Production (thousand lbs U_3O_8)	Royalty Paid (C$ million)	(US$ million)	(US$ per lb)
1988	21,233	19.8	16.1	0.76
1987	21,380	20.3	15.3	0.72
1986	17,943	19.3	13.9	0.77
1985	15,411	33.9	24.8	1.61
1984	15,614	22.3	17.2	1.10
1983	6,109	13.7	11.1	1.82
1982	7,698	28.4	23.0	2.99
1981	7,467	23.8	19.8	2.65
1980	6,242	14.3	8.4	1.35
1979	6,486	12.5	10.8	1.67
1978	6,783	5.4	4.7	0.69
1977	6,226	1.2	1.1	0.18
1976	4,880	1.0	1.0	0.20

Saskatchewan. The new system is regarded as revenue neutral, but is considered fairer and less controversial than its predecessor. This graduated royalty system allows for full recovery of investment plus implicit interest before the graduated royalty becomes payable, and as such, can be considered a significant incentive. The government expects to realize about C$21 million in royalties under the new system this fiscal year. **Table 3** shows the actual royalties paid on uranium production in Saskatchewan for 1976-1988.

MINING LAW

Mining law in Canada includes both federal and provincial regulations, but the provinces have assumed much of the responsibility for regulating mineral development. An overview of some of the regulatory factors affecting mining operations in the Provinces of Ontario and Saskatchewan is shown in **Table 4**.

In order to explore for minerals in Canada, there are often preliminary licensing requirements. Generally a person must obtain a prospectors license to be allowed to look for minerals. Provinces that require this license emphasize that the prospecting license does not convey any interest in land or minerals.

Most provinces will also grant exploration licenses or permits. These grant exclusive rights to explore for minerals in designated areas. The government uses these permits to encourage exploration in certain areas. Permit holders have the right to convert all or a portion of a permit into claims, provided they have complied with the terms and conditions of the regulations.

In areas where permitting is not an option, mineral interests are acquired, initially, by staking a claim. There are distinct differences between provinces, but generally a certain plot of land must be physically "ground staked" and registered promptly with the province. "Map staking" on surveyed land is also done. A claim does not grant the right to remove minerals from the ground (except by permission for testing purposes). Once a claim is recorded and meets all regulatory requirements, the claim holder may then apply for a lease to develop the property and produce from an economically viable deposit. In Saskatchewan, claim holders are guaranteed the right to take their claims to lease provided they have complied with all regulations.

The rights conferred by mineral interests vary depending upon the level of license. Generally, a claim grants the exclusive right to explore, prospect and develop minerals within its area. A lease is required for actual mining operations.

Specific regulations prescribe the physical characteristics of mining interests. In surveyed land, claims are defined in terms of the provincial land survey system; claims lying on unsurveyed land must be ground staked. Legislation also defines the typical dimensions of claims, but allows for some imperfection in ground staking due to the informal nature of ground staking itself. However, specific dimensions and locations must be formalized before a lease is granted; that is, lease boundaries have to be staked or surveyed.

All mining interests have definite time spans of validity. While differences between provinces again are significant, claims typically are valid (assuming other regulations are met) for one or two years initially, with yearly renewals necessary for continuing rights. Leases are generally longer term, ranging from 10 to 21 years, to provide the confidence of tenure to those entering production.

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Table 4
Comparison of Some Ontario and Saskatchewan Mining Regulations and Rights

Regulatory Factors	Ontario	Saskatchewan
Preliminary Licensing Requirements	• Requires prospecting license	• No preliminary license necessary
Exploration	• License of Occupation • License to Prospect	• Exploration Permit—only available in certain areas. Only requires regulatory compliance.
Acquisition of Mineral Rights	• Meet eligibility requirements • Mining Claim — ground staking — record claim within 31 days and pay fee — provide compensation for surface rights, if necessary • Receive Certificate of Record • Lease	• Meet eligibility requirements • Mining Claim — ground staking – unsurveyed land — map staking – surveyed land — record claim within 20 days — pay recording fees • Receive Claim Certificate—a claim guarantees the right to go to a lease • Lease
Rights Conferred by Mineral Interests	• Claim–no rights to material; only right to obtain Certificate of Record • Lease — requires Certificate of Record — provides right to produce minerals, subject to certain reservations and that minerals must be treated and refined in Canada.	• Permit–exclusive right to explore an area, but not to remove material except approved quantities for testing. • Claim–same as permit • Lease–grants exclusive rights to explore, mine, work, produce, and carry away mineral; subject to federal processing restrictions.
Physical Characteristics of Interests	• Claim–unsurveyed – maximum 40 acres; square shape. Irregular shapes allowed with special permission • Claim–surveyed–approximately 40 acres; square shapes as subsections of surveyed plots	• Permit–not less than 10,000 hectares, nor greater than 50,000 hectares; rectangular shape with length less than six times width. • Claim–unsurveyed – not less than 16 hectares nor greater than 6,000 hectares; rectangular • Claim–surveyed – same size limits as unsurveyed, but must include legal subdivisions and coincide with existing boundaries.
Duration and Renewability	• Claim–maximum 5 years, then one additional year to file and pay for lease — deadlines may be extended up to five years in certain circumstances • Lease–valid for 21 years, renewable for 21 year terms	• Exploration Permit–valid for 2 years; may not be renewed • Claim–Initially 2-year term from application date; renewable in one year increments • Lease–valid for 10 years; renewable for 10-year terms

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Table 4 *(continued)*
Comparison of Some Ontario and Saskatchewan Mining Regulations and Rights

Regulatory Factors	Ontario	Saskatchewan
Work Requirements	• Must earn Certificate of Performance by spending certain amounts of money on interest. Formerly was based on number of days worked.	• Permits, Claims, and Leases–holder must spend certain amounts of money on the interest. Permits require a refundable cash deposit. Excess expenditures can be carried forward for future work credits, but only for that dispostion.
Transfer of Interest	• Few restrictions to transfer. Some transfers must be approved by the Minister.	• Transfers subject to strict, but not restrictive, regulations. The main restriction is that the transfer must be unconditional.
Cancellation of Interests	• Interests may be cancelled by if all regulations are not followed, or if interests were obtained illegally.	• Can be cancelled for any breach of terms of interest or failure to meet all regulations.
Acquisition and Compensation for Surface Rights	• Claim–Mineral rights holder has the right to enter and use the portions of area necessary to explore or operate a mine, but has no other claim to surface rights. • Lease–usually includes surface rights, where available. • If holder of surface rights withholds consent to mineral rights holder, Commissioner can become involved and grant disposition as necessary.	• Mineral interests grant no surface rights–must be acquired from government or private owner. • If public land, holders of mineral interests in good standing may apply to the agency responsible for administration of surface rights. (In northern Saskatchewan, it is the Department of Parks.)

In every province or territory, a certain amount of genuine mineral activity is required in order to keep an interest in good standing. Most provinces require a certain minimum dollar amount be spent annually per area of land. Some provinces (for example, Ontario and Nova Scotia) formerly measured work performance by the number of days of work, but they are switching to a dollar expenditure system. This monetary or time level of work needs to be confirmed by certificates of performance or other means of verification. Sometimes payment of deposits in lieu of work performed is acceptable. Additionally, excess work from year to year can sometimes be carried forward, depending on the province, to meet work requirements. Different dollar amounts are required depending on the type of interest (permit, claim, or lease), as well as the length of time the interest has been held. Generally, more time or money must be spent to meet the minimum work requirements, the longer the interest has been held. These minimum requirements usually increase every five to ten years.

To transfer an interest to another party, few restrictions apply. The transfer must be officially recorded, and all rules and regulations must be strictly followed. Some mining interests, depending on the province, can only be transferred with consent of the Minister. Foreign interests in uranium projects are generally restricted to a maximum of 49% by federal policy statements.

The provincial government may cancel the mineral interests of an operator for any number of reasons. Such cancellation is usually due to the failure of the holder of the interest to comply with the legislation governing the conditions of the interest. For instance, any of the

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following could be grounds for cancellation of an interest: expired license; not meeting work requirements; failure to pay appropriate fees or rents; or not filing proper applications or work reports. Fraud, misrepresentation, or bankruptcy can also be grounds for cancellation.

Rights to enter and use the surface of public lands for mineral purposes can be obtained from the applicable government department. If the use of private land is necessary, conflict of interests may occur, and regulations regarding this situation vary from province to province. Some provinces allow access by permission of the owner only, while most others have some form of arbitration legislation to settle any differences. In all cases however, surface rights holders are compensated for any loss or damage sustained.

LICENSING PROCEDURES

Once an operator has staked a claim and acquired the mineral rights, surface rights, and a lease to operate a uranium production facility, the next step is to obtain the federal licenses that pertain to operation.

Federal Requirements

Two federal ministries affect the uranium industry. The Ministry of Energy, Mines, and Resources (EMR) has the responsibility to formulate policies, and the AECB is charged to administer those policies. Thus, federal licensing is done by the AECB. Canada has a joint regulatory process, whereby the federal and provincial governments consult one another before issuing a license. The federal government uses a staged licensing process in which licenses are issued for each phase of the life of a uranium production facility; pre-development, siting and construction, operating, and decommissioning. In the pre-development stage it is necessary to attain a Removal License and an Excavation License. Site and Construction Approval is granted by the AECB after an Environmental Impact Statement (EIS) and a preliminary design for the facility have been submitted and accepted, and reviewed by the public. When a facility prepares for the operating stage, it is required by the AECB to secure a Mining Facility Operating License. This license is normally issued for a two-year term, and only after submission and approval of a detailed safety report, and an updated EIS, as well as reports on anticipated production levels and expected waste quantities. The final stage requires a Decommissioning License to ensure that proper decommissioning plans have been approved, and follow-up monitoring systems are in place. This staged licensing process assures that the facility will conform to current regulations throughout its lifespan.

In addition to the licensing requirements, effective April 1, 1990, the federal government and the AECB instituted new federal licensing fees. Previously, the federal licensing process had levied no charges. These new fees are designed to provide full financing for AECB operations; every facility that is, in any way, regulated by the AECB must pay fees that will fund all AECB operators. This new law uses an established fee schedule for determining the annual payments required. For example, an annual fee of C$84,600 is required for a siting or construction license, and must be paid at the time of application for the license. A uranium facility with a mill and tailings area must pay an annual operating license fee of C$425,000, also payable at the time of application for the license. If use of the license is completed before the end of its term, the balance of the fee will be refunded on a pro-rata basis.

One other key federal regulation pertains to foreign ownership in the uranium mining sector. The EMR has issued policy statements that limit foreign ownership interests to a maximum of 49%, with exception granted to allow greater percentages of foreign ownership if it can be clearly established that the project is Canadian-controlled. However, a potential pitfall exists in the foreign ownership regulations. The AECB, which regulates the industry, does not recognize, and therefore does not enforce, these EMR policy statements. Thus, the AECB could approve the entire licensing process of a project without even referencing foreign ownership. Yet, the EMR policy statements are regarded as official legal policy by the Canadian federal court system, and thus the policy statements must be followed as law, even if the AECB does not enforce them.

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Provincial Requirements

Using Saskatchewan as an example for provincial regulations, if a new mining operation or expansion of an existing facility is proposed, the operator must receive permission from the Minister of Environment and Public Safety (EPS). In order to receive approval from the EPS Minister, an EIS must be submitted. This very comprehensive study is in final form when submitted to the Minister. The EIS must also be open for public review—this review process is to provide input to aid the Minister in making his approval decision. During the review process, the Minister has the option of appointing a Public Board of Inquiry for further review. The two most recently-developed uranium mines in Saskatchewan both went to Boards of Inquiry. The operator must next ensure that it has signed a surface lease with the Province of Saskatchewan before proceeding with any construction. The surface lease can be issued prior to completion of the EIS review.

The Mines Pollution Control Branch of the EPS utilizes two main types of documentation to enforce Saskatchewan environmental regulations: Construction Approvals and Permits to Operate. Construction approvals are necessary for building any waste handling or treatment facility, and require specialized review before being authorized. Permits to Operate are only valid for one year at a time, and require a thorough and detailed review of environmental compliance before being renewed. Typically, the licenses will contain operating requirements common to the industry as a whole, as well as specific regulations pertaining to that particular facility. These very comprehensive licenses are the basis for Saskatchewan's regulatory program.

In addition to operating regulations, the licenses also require operators to have quality assurance programs to ensure that the data and reports being filed are accurate and represent the actual conditions at the mine or mill. The Saskatchewan Ministry of Environment and Public Safety also requires any new proposals to include a conceptual decommissioning plan in the EIS. Proponents then must submit a detailed decommissioning plan before undertaking any decommissioning and reclamation work.

OCCUPATIONAL HEALTH AND SAFETY

Background

Before 1978, the Atomic Energy Control Board (AECB), had no jurisdiction over health and safety matters relating to the uranium mining industry. Each province was responsible for the safety of its mines and the health of the mines' workers. In 1974, in response to criticism by an opposing political party and to labor problems, the Ontario government established the Ham Commission to examine occupational health and safety in uranium production. The Ham Commission released its recommendations in 1978. Later that year, the government adopted the commission's recommendation that the AECB should be responsible for regulation of the entire nuclear fuel cycle.

Ontario

Although regulation of the radiological aspects of mine safety and the workers' health, and the authority to issue overall operational approvals, were vested in the AECB after 1978, Ontario maintains a strong regulatory influence. Ontario's radiological health and safety regulations for uranium mining were adopted by the AECB for its regulation of Ontario mining. Ontario's inspectors regulate conventional health and safety aspects of the mines and workers. Ontario is then paid by the AECB to enforce the radiological regulations and supply the inspectors, who are given AECB authority to enforce what were Ontario's laws, and are now Canadian laws applicable to Ontario. Some of the health and safety areas that are regulated and inspected are, for example, silica dust limits, gamma radiation exposure and personal radon daughter dosage.

Saskatchewan

In contrast, the Saskatchewan government took an active role in establishing concurrent jurisdiction. For example, to avoid conflict with the federal government's health and safety regulations, the Saskatchewan government passed occupational health and safety regulations that must be met in order to be granted a surface lease (leases can only be granted by the provinces). Therefore, if an operator fails to comply with the stricter provincial standards, the lessee can be sued for breach of contract and the lease revoked if the lessee is found guilty. The province has no other means to enforce its stricter standards

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Because the province is limited to this form of enforcement and the private sector must contend with dual regulation, the AECB and Saskatchewan government have been working to improve the regulations and enforcement procedures. The agreements have all been worked out and are now awaiting legislative approval at both the provincial and national levels. If the legislative approval is received, Saskatchewan will be much like Ontario, in that all authority to regulate radiological health and safety standards will be ceded to the control of the AECB. The AECB will adopt Saskatchewan's radiological health and safety standards, and then pay Saskatchewan to provide the enforcement of the radiological standards, which will apply only to uranium mining in the Saskatchewan province. ■

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PRIBRAM URANIUM DISTRICT

Overview

Pribram is one of the largest and richest vein uranium districts in the world. The Pribram district has accounted for about 60 percent of Czechoslovakia's total uranium production. The Pribram uranium district is located about 60 kilometers southwest of Prague, in Czechoslovakia's central Bohemia region. This district contains perigranitic, monometallic, vein-type uranium deposits. The deposits are within a northeast-southwest elongated area, about 20 kilometers long and 1-2 kilometers wide, located between Oboriste in the northeast and Tresko in the southwest. Several thousand veins have been discovered; about 1,600 have been mined. Most of the veins are grouped in clusters, which are intense accumulations of veins paralleling or intersecting each other within a narrow segment.

In total, about 155 million metric tons of ore and waste have been mined, 85 million tons of which has been hoisted to surface; the remainder was used underground as backfill. Production to date has yielded approximately 65,000 metric tons equivalent U_3O_8. The estimated average grade for ore mined is about 0.75% U_3O_8. Pribram, as with all other uranium mines in Czechoslovakia, is owned and operated by Ceskoslovensky Uranovy Prumsyl (CSUP).

Exploration first started in 1947, in the lead, zinc, and silver mines that are located about 3-4 kilometers northwest of the main uranium zone. These multimetallic veins contain some uranium in the upper levels. Uranium mining began in 1950. Production peaked at about 1,900 MTU per year between 1960 and 1970. By 1976, production had dropped to 900 MTU per year, and has now fallen to 500-600 MTU per year. The Pribram district's reserves are almost depleted, and production is expected to cease in 1991 or 1992.

Until this year, all uranium production was exported to the USSR, with only the amount required for Czechoslovakia's nuclear power stations being returned (as fabricated fuel). Most of Czechoslovakia's present and future uranium production will come from sandstone deposits in the North Bohemian Cretaceous Basin, such as Hamr and Straz.

Geology

Host rocks are dominantly Upper Proterozoic schists (Spilite and Post-Spilite Series), and locally-Cambrian clastic sediments which are slightly regionally-metamorphosed and contact-metamorphosed. Pribram's sediments have been folded into a 25 kilometer-long asymmetric anticline, and a westerly adjacent syncline.

An abundance and variety of dikes, sills, apophyses and stocks intrude the sequences. Dikes are 0.5 meter to 15 meters wide, and can persist for as much as 1,000 meters, both laterally and vertically.

The most important intrusion is the hetergenous granitic Central Bohemian Pluton, which forms the southeastern boundary of the district. At this contact, the pluton flank is northwesterly overturned to a depth exceeding 2,000 meters (**Figure 1**).

The district is at the junction of the NE-SW trending Central Bohemian Lineament, and the NW-SE oriented Jachymov Lineament. This position resulted in a complex fault pattern (**Figure 2**). Local faults of various directions are abundant, extending from tens of meters to a few kilometers, and undergoing repeated reactivation. Displacements are commonly less than 30 meters. Three types of faults are distinguished: unmineralized, mineralized (containing uraniferous veins), and dike structures.

Wall rocks are modified by a variety of alterations. Most prominent are sericitization, illitization, chloritization, carbonatization, and hematitization. Alteration aureoles in sediments commonly persist for 0.1 to 3.0 meters from veins, but are more extensive in intrusive rocks. In segments of multiple veins, alteration may spread over intervals tens of meters in width.

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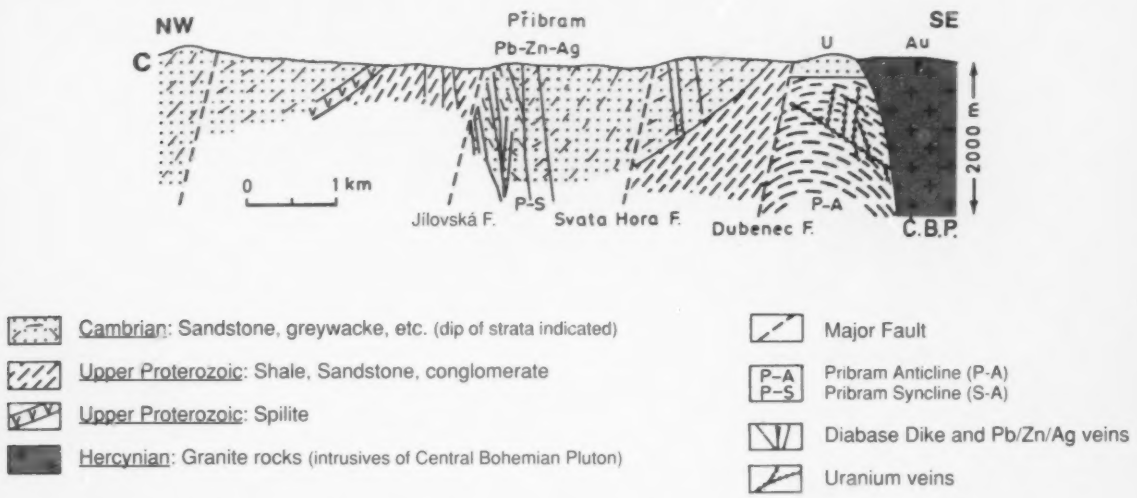

Figure 1 — Pribram Uranium District. NW-SE section across the regional structural grain. The diagram illustrates in a schematic mode the location of Pb, Zn, Ag, U, and Au veins with respect to the overhanging pluton contact. Structures of the Central Bohemian Lineament trend NE-SW, those of the Jachymov Lineament trend NW-SE.

Mineralization

The principal uranium mineral is pitchblende. Coffinite and uraniferous anthraxolite occur in small amounts. Sulfides, mainly lead, zinc, and iron, are present, but in minor quantities. Calcite is the dominant gangue mineral. In total, more than 50 minerals, including 35 ore minerals, have been identified in the Pribram uranium ore. They form four principal mineral stages: Siderite-sulfide, early calcite, calcite-pitchblende, and calcite-sulfide.

Four types of vein infillings, based on the quantitative presence of the respective mineral assemblages, are recognized:

- *siderite-sulfide veins* containing 60-90 volume-percent (%) of the stage one siderite-sulfide assemblage;
- *calcite-pitchblende veins* containing 90 % of minerals of stages two to four;
- *calcite veins* containing 100 % of minerals of the stage four calcite-sulfide assemblage;
- *mixed veins* containing minerals of all stages.

Three types of recoverable ores can be identified based on the predominance of distinct ore minerals:

- pitchblende ore;
- uraniferous anthraxolite ore;
- sphalerite-galena-silver ore.

The uranium minerals display a distinct zoning. Intrinsic and extrinsic veins near the intrusive contact contain only pitchblende. Veins farther from the contact also contain anthraxolite, which increases in amount as the distance from the contact increases. The amount and relative fraction of anthraxolite increases laterally, from the margins of the district to the center of the district, where the major vein clusters developed, and where the veins have the greatest depth persistance. The relatively large quantity of anthraxolite in vein clusters combined with the presence of methane and hydrocarbons, suggests a genetic relationship between the organic material and fracturing. A source of the organics may be the carbonaceous/graphitic constituents of the Spilite Series underlying the deposit.

Mineralized veins can be separated into three groups based on their dimensions:

- Large veins that extend laterally and vertically for 500-1,000 meters and more (some veins persist to a

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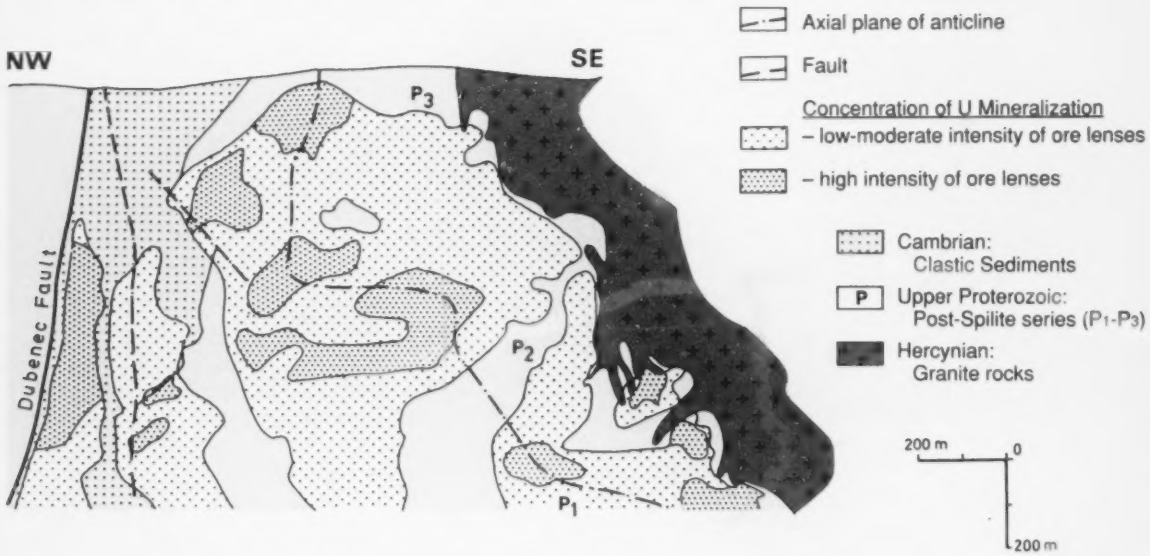

Figure 2 — Pribram Uranium District. Vertical projection of a NW-SE oriented U vein.

depth of more than 2,000 meters) at a thickness of 5-100 centimeters. In extreme cases, some veins can be up to 12 meters thick. The large veins constitute the principal structures of vein clusters and account for approximately 5% of all veins in the district.

- Medium veins extending 100-500 meters with thicknesses of 1-50 centimeters. These veins commonly occur as subsidiary veins to the large veins and account for 45% of all veins.
- Small veins extend up to 100 meters and are less than 50 centimeters wide. They occur subsidiary to the larger veins and constitute 50% of all veins.

Mineralization forms tabular to lensoid bodies emplaced in one or several branches of structures. These pay streak lodes are of complex geometry, and are composed of gangue with pitchblende, anthraxolite, coffinite in the form of stringers, coatings, botryoidal aggregates, and pods. The pay streaks range in size from a few millimeters to tens of centimeters thick, and extend laterally and vertically from one to several hundred meters. Most veins contain only one uranium-mineralized lense, but larger and more extensive veins may host up to 15 individual lodes.

The lodes have irregular boundaries and alternate with non-uranium veinstuff. Together, they form bodies with dimensions of about 1,000 to 100,000 square meters. The pay streak part of the vein may constitute 1-50% of the total vein infill, which corresponds to a coefficient of mineralization (Kr: the ratio of mineralized plane to total plane of a vein) ranging from 0.01 to 0.5. Approximately 60 percent of the ore bodies have a Kr that is between 0.04 and 0.16. Kr values above 0.3 are only found in small ore bodies.

Although economically-recoverable mineralization occurs in an area about 20 kilometers long, the bulk of the ore (50-60% of the total reserve of the district) is concentrated in a 3-4 kilometer-long zone in the Bytiz sector. One vein system in this sector, Bt-4, yielded 10,000 to 15,000 metric tons U_3O_8. The upper limits of the veins of this sector are in the southwestern section

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(near shaft 16), about 100 meters below the surface, and in the northeast, about 300 meters below the surface (near shaft 19). The veins persist to a depth of 2,000 meters or more.

Lithology imposed a twofold control on the deposit; physical-mechanical properties influenced the location and development of structures, and chemical composition affected the chemistry of mineralizing fluids. Correspondingly, uranium distribution displays the following lithologic controls:

- 97% of the uranium mineralization is emplaced within the Post-Spilite Series, whereas Cambrian sediments, tuffites of the Spilite Series, and granites, contain only 3% of the lodes.
- The richest intervals developed where host rocks reacted to tectonic stress by more brittle deformation and wider cataclastic extension, thereby providing adequate permeability, and allowing the rocks to best react with the mineralizing fluids.

The uranium is postulated to have originated from sediments, with subsequent enrichment during magma differentiation. Leaching of uranium from the granitic rocks occurred by fluids migrating along NW-SE oriented faults. Isotope studies suggest that a certain supply of uranium may have been derived from residual magmatic solutions. Contact-metamorphism may also have mobilized uranium within the metasediments.

A direct relationship between ore formation and granite intrusion is disputed. Uranium/Lead datings of pitchblende I yield ages of 265(±15) million years. Therefore, pitchblende crystallization occurred approximately 20 million years after the consolidation of the last intrusive phase of the Central Bohemian Pluton. As such, the situation in the Pribram district displays a similar time gap between magmatic intrusion and pitchblende formation, just like most other granite-related vein uranium deposits within the late Paleozoic Hercynian orogenic belt in Europe.

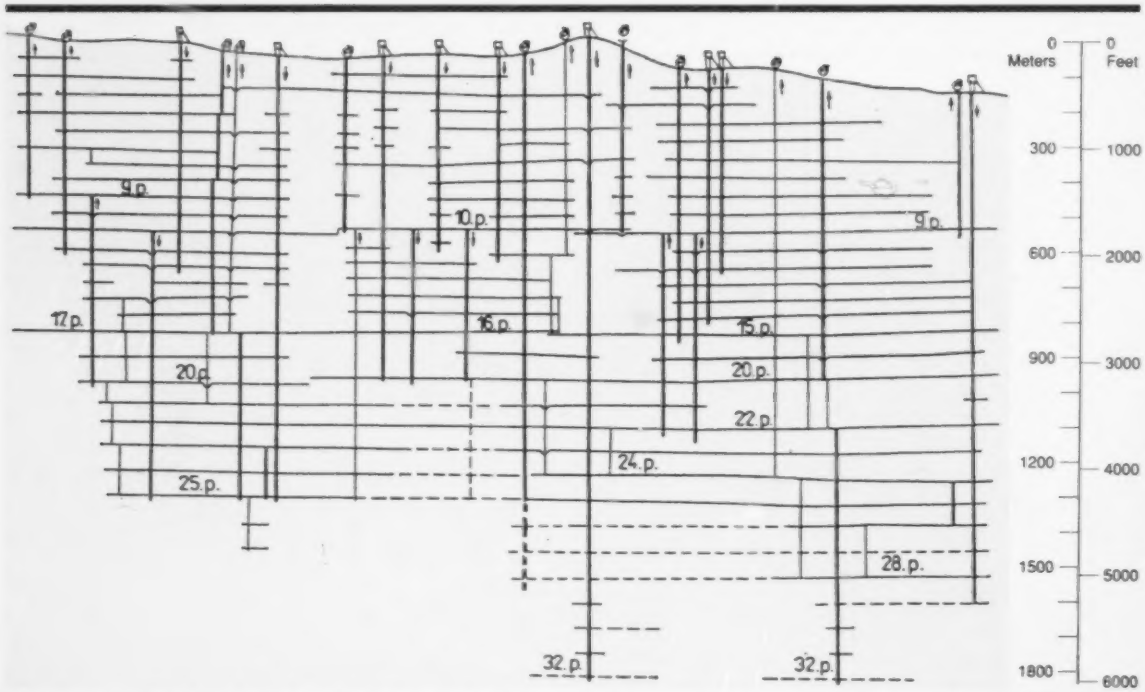

Figure 3 — Pribram Uranium District. SE-NW section along central part of the district. Diagram shows the development scheme of shafts, blind shafts, and drifts. Levels are 50-60 meters apart. The deepest level is level 32, 1,836 meters (6,024 feet) below the surface. Arrows indicate ventilation direction in shafts.

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Mining

The Pribram mine is an underground mine with 32 levels and 68 shafts, including internal shafts. The deepest shaft is 1,836 meters (6,024 feet) deep (**Figure 3**). Temperatures at this depth reach 45C (113°F). The mine's cooling system lowers the working temperatures to about 25-30C (77-86°F).

Haulage levels have a vertical separation of 50-60 meters. Extraction blocks (stoping segments) are 50-60 meters high and 50 meters long (total face is approximately 2,500 square meters). Mining width averages 1.0-1.2 meters (0.8 meters is the minimum width). Extraction is by overhand stoping from sublevels with 5 meters of vertical separation. Ore is selectively recovered from the veins. Waste is blasted first, removed or used as backfill, then the ore is blasted and separately recovered. Veins containing large ore lenses are mined in such a way that unmineralized vein sections remain as pillars. Material containing subgrade uranium contents are partly heap-leached underground. Alkaline ISL was tested at Bt-4 and Bt-5 on the 20th level, but did not prove very successful.

Run-of-mine ore is preconcentrated by radiometric and gravimetric sorting to about 2% U, using a cut-off grade of 0.01-0.02% U. Waste and subgrade fractions are selectively stockpiled. Better grade material is heap-leached on site. Presently, 1,300 metric tons of ore is produced per day. The concentrate is shipped 90 kilometers, by rail, to the central mill at Mydlovary, north of Budejovice. The mill, which was constructed during the period 1959-1963 and expanded in 1970, has a capacity of 700,000 metric tons per year. ■

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URANIUM EXPLORATION AND DEVELOPMENT UPDATE

The August 1990 NUEXCO Monthly Report #264 characterized exploration activity in the US as being in a "survival" mode. Exploration activity in Canada is also at very low levels, but even so, a new, world-class deposit has been discovered. During 1990, work continued on a number of important projects, while several major mines cutback production, or closed down altogether.

Canada is still the largest uranium producing and exporting country in the world, despite the limited amount of recent exploration. Most exploration activity has been focused within areas favorable for the occurrence of deposits linked to Proterozoic uncomformities, most prominently in northern Saskatchewan's Athabasca Basin.

CURRENT ACTIVITY IN CANADA

Cameco is the predominant operator in Canadian exploration and development projects. At the Cigar Lake deposit, Cameco (operator for, and 48.75% owner of, the Cigar Lake Mining Corporation) announced in August that it had completed excavation of a 500-meter shaft and was continuing with the test mining program. Shaft furnishings are to be completed by the end of 1990, with mining tests from lateral development of three drifts, each 120-150 meters long, beginning in 1991.

However, Cameco's most important announcement concerned the McArthur River P2 North deposit, a little over 40 miles northeast of Cameco's Key Lake mine. Cameco is the operator for the McArthur River Joint Venture which is owned by Cameco (44.0%), Uranerz Exploration and Mining Ltd. (29.4%), AGIP Resources Ltd. (10%), Interuranium Canada Ltd. (9.1%), Cogema Canada Ltd. (6.5%), and Imperial Metals Corp. (1.0%). On May 30, Cameco announced the discovery of a deposit expected to contain in excess of 100 million pounds equivalent U_3O_8. Initial testing placed the average ore grade at 3%. However, Cameco announced this month that these figures have been revised significantly upward to a grade of approximately 4% on reserves of about 200 million pounds. On this basis, the McArthur River discovery ranks among the top two or three uranium deposits in the world.

Cogema Canada Ltd. will resume drilling activity in Saskatchewan in November. Two-thirds of the drilling in northern countries of the world is done in the dead of winter, as all bogs, rivers, and so on, are frozen over and therefore easier to traverse. In April, Cogema Canada had completed a drilling project with two rigs at the Henday Lake Project.

Denison Mines Ltd. announced, in April, that the underground test mining program at its Midwest Project had been completed and that the results of a feasibility study would be released by the end of 1990. The test mining program included the sinking of a 185-meter shaft in 1989, and the subsequent drilling of two 4-foot diameter bore holes, through the ore body, from an underground drill station that was just above the ore zone. The Midwest project is located in the eastern part of the Athabasca Basin, just 15 miles from Cameco's Rabbit Lake project. Denison has stated that the project has total resources of 56 million pounds equivalent U_3O_8 at an average grade of 1.25% U_3O_8. The proposed production rate is 3.6 million pounds equivalent U_3O_8 per year.

Interuranium Canada Ltd. reports no drilling activity in the Athabasca Basin. However, at a location that Interuranium Canada did not disclose, one drill rig has been active for the past several months.

Minatco Ltd. is planning ongoing exploration and feasibility studies at its Wolly project, which includes the McClean Lake site. This site is on the eastern side of the Athabasca Basin, west of Wollaston Lake. Minatco announced early this year that it had discovered ore grade mineralization at shallow depths in the McClean Lake area. This discovery is in addition to the previously known resources of the area, which total some 18.7 million pounds equivalent U_3O_8 at an average grade in excess of 1.5% U_3O_8.

PNC Exploration (USA) Inc. reported the completion, in March 1990, of a time/domain/electro-magnetic geophysical survey in the eastern part of the Athabasca Basin.

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Figure 1
Major Exploration & Development Projects, and Mines, of the Athabasca Basin

Urangesellschaft (UG) had one drill rig operating during the summer at the Sisson Schultz South project. UG is the operator; PNC Exploration (USA) Inc. and Daewoo Corp. of Korea are partners in the project. The project is about 100 miles north of Baker Lake and near Kiggavik, in the Keewatin area of the Northwest Territories. This area is within the Thelon Basin, which is very similar, geologically, to the Athabasca Basin of northern Saskatchewan. During the short summer season for exploration, about 20,000 feet of drilling was planned. The rate of progress was 200-300 feet per day on 500-1000 foot holes.

UG, as also the operator for the Kiggavik project (UG–79%, CEGB Exploration Canada–20%, and Daewoo Corp. of Korea–1%), which is now in the mine-planning stage. Initial plans call for two open pit mines, which would operate over an 11-year period to produce a total of 45 million pounds equivalent U_3O_8. However, UG recently put the proposed C$150-$175 million development of the mine on hold because of two issues.

The first is that the Federal Environmental Review Office (FEARO) has requested substantially more information than UG initially submitted. UG has requested an indefinite delay of FEARO's environmental hearings, in order to perform the appropriate research and field work, and prepare thorough documentation. UG must also submit all new documentation to the FEARO panel "in layperson's language," written both in English and in Inuktitut (the language of the Inuit natives).

The second issue is an agreement-in-principle between the federal government, the government of the Northwest Territories, and the Tungavik Federation of Nunavut regarding the Inuit land claim. The mining development provisions of the agreement are not yet clear, and UG wants to assess the potential impact of the agreement on the Kiggavik project.

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CANADIAN REGULATORY ATMOSPHERE

The entire Canadian uranium industry is concerned about recent changes in the regulatory environment. The latest federal budget for the regulatory agencies has nearly doubled. Also, Saskatchewan's government has approved a 40% increase in the regulatory budget, and provided funding for over one-third more staff. René Lévesque, board president of the Canadian Atomic Energy Control Board (AECB), confirmed the government's hard-line position when he stated, "We will take drastic health, safety and environmental protection measures, including shutting down nuclear facilities and prosecuting their operators, to guarantee that they fulfill every detail of their licenses."

These were not hollow declarations, for on May 18, the AECB suspended the license of Cameco's Blind River uranium refinery for one week, because of the May 16-17 release of an excessive amount of uranium dust. In other legal actions, and the first ever against mine operators, Cameco was fined C$10,000 for a waste water spill at the Rabbit Lake mill, and Rio Algom was fined C$3,000 for excessively alkaline discharges from the Elliot Lake site.

The AECB board wants to put more impact into its regulatory actions by substantially increasing the penalties it can wield. However, such changes in penalties will require legislative reforms before the increased penalties can be implemented.

The uranium industry is concerned that these regulatory changes, and the many more that are likely to follow, will further limit the industry's ability to profitably mine uranium, especially in an already weak market. New projects may not be mined, or even explored, and existing facilities may close, if restrictions become too extensive and expensive.

CANADIAN PRODUCER RESPONSES TO THE WEAK URANIUM MARKET

The weak worldwide market for uranium is already taking its measure of Canadian producers. In March, Denison cut back production at Elliot Lake by 37%, and in August, Rio Algom closed both its Quirke and Panel mines. All three of those mines had production costs approaching US$30 per pound U_3O_8. Companies with deposits that can be mined at profitable costs will be the likely suppliers in the near future. The focal question then becomes, what will these production costs actually be. It is possible that what could have been mined profitably a year or two ago, may no longer be profitable as a result of new regulatory requirements.

Much as in other parts of the world, Canadian producers are turning to acquisitions instead of exploration in order to maintain their reserve positions. Another trend of interest is the redirection of uranium exploration programs to gold exploration, as the gold market is healthier. This measure also has effect of reducing expenditures on grass-roots uranium exploration.

CURRENT US ACTIVITIES

Recent US exploration and development activity has also been at very low levels, with the notable exceptions of two in-situ leaching (ISL) projects. The two are Uranium Resources, Inc.'s (URI) Rosita project in the South Texas district, and Ferret Exploration Company of Nebraska's (FEN) Crow Butte project, in Nebraska.

URI's Rosita project began operation on September 4, at a rate of 0.8-1.0 million pounds equivalent U_3O_8 per year. Production is from shallow depths within the Goliad Formation, and is one of the lowest-cost production sites in the US, at less than $10 per pound U_3O_8.

FEN's Crow Butte project has kept three drills going all summer. The initial well field is nearly completed and plant erection is finished. Piping and electrical work are continuing, and production is expected to begin in early 1991. The mine's production costs should also be low. This new mine is in a new district that has not had any prior uranium production: the mine will exploit a major uranium occurrence in the Chadron Formation.

US exploration activity remains essentially confined to the Arizona Strip, where Energy Fuels Nuclear, Union Pacific Resources, and Pathfinder Mines have active projects. Power Resources has kept three drill rigs busy at its Highland Ranch Project in the South Powder River Basin of Wyoming, maintaining the project's production capability of 1.0 million pounds equivalent U_3O_8 per year.

Tom Pool
Bob Steele

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NUCLEAR INDUSTRY CALENDAR

1990

Nov. 11-14 ***Nuclear Energy Forum*** (Washington Hilton, Washington, DC).
Sponsored by the USCEA and the American Nuclear Society.
Contact: USCEA Conference Office; 202-293-0770: or ANS Meetings Department; 312-352-6611.

Nov. 12-16 ***First Regional Seminar for Europe and the Middle East on Quality Management for Nuclear Power Projects*** (Prague, Czechoslovakia). Sponsored by the IAEA.
Contact: Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

Nov. 12-13 ***Fourth World Electricity Conference*** (London, England).
Sponsored by The Financial Times Ltd.
Contact: Financial Times Conference Organization; 71-925-2323, Telex: 27347, Fax: 71-925-2125.

1991

Jan. 13-16 ***Nuclear Insurance Conference*** (The Peabody Orlando Hotel, Orlando, Florida).
Sponsored by the USCEA.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

Feb. 3-6 ***Nuclear Marketing: Utility Needs in the 1990s*** (Clearwater, Florida).
Sponsored by the American Nuclear Society.
Contact: ANS Meetings Department; 708-352-6611.

March 24-27 ***Fuel Cycle Conference '91*** (Sheraton Scottsdale Hotel, Phoenix, Arizona).
Sponsored by the USCEA.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

April 8-10 ***Japan Atomic Industrial Forum Annual Conference*** (Tokyo, Japan).
Contact: Japan Atomic Industrial Forum; 3-508-2411; or Fax: 3-508-2094.

April 14-17 ***INFO '91 Conference*** (The Westin Hotel, Chicago, Illinois).
Sponsored by the USCEA.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

April 14-18 ***Third International Conference on Nuclear Fuel Reprocessing & Waste Management*** (Sendai, Japan).
Sponsored by the Atomic Energy Society of Japan and the Japan Atomic Industrial Forum, co-sponsored by the American Nuclear Society and the European Nuclear Society.
Contact: Japan Atomic Industrial Forum; 3-508-2411; or Fax: 3-508-2094.

April 22-25 ***JAIF International Conference on Water Chemistry in Nuclear Power Plants*** (Fukui, Japan).
Contact: Japan Atomic Industrial Forum; 3-508-2411; or Fax: 3-508-2094.

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CALENDAR

1991

May 12-14 ***World Nuclear Fuel Market Annual Meeting*** (Atlanta, Georgia).
Contact: Donna Cason, World Nuclear Fuel Market; 404-447-1144.

May 13-15 ***Second International Conference on Transportation for the Nuclear Industry***
(Bournemouth, England).
Contact: Conference Secretary, The Institution of Nuclear Engineers; 081-698 1500.

May 14-16 ***Annual Meeting on Nuclear Technology '91*** (Hotel & Congress Center Maritim, Bonn, Germany).
Sponsored by the Kerntechnische Gesellschaft e.V. and the Deutsches Atomforum e.V.
Contact: INFORUM GmbH, Congress Office JK'91, Heussallee 10, D-5300 Bonn 1, or 0228/507 223.

June 2-6 ***American Nuclear Society Annual Meeting***
(Marriot Orlando World Center, Orlando, Florida).
Contact: ANS Meetings Department; 708-352-6611.

June 23-26 ***International Conference on Enrichment*** (The Westin Hotel, Washington, DC).
Sponsored by the USCEA.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

Sept. 4-6 ***Uranium Institute Sixteenth Annual Symposium*** (London, UK).
Contact: Uranium Institute; 44-71-225-0303; or Fax: 44-71-225-0308.

Sept. 22-25 ***International Uranium Seminar '91*** (The Don Cesar Hotel, St. Petersburg/Tampa, Florida).
Sponsored by the USCEA.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

Sept. 29-Oct. 2 ***American Mining Congress Mining Convention*** (Salt Lake City, Utah).
Contact AMC Convention Office: 202-861-2800; or Fax: 202-861-7535.

Nov. 10-13 ***Nuclear Energy Forum*** (Westin St. Francis Hotel, San Francisco, California).
Sponsored by the USCEA.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

Nov. 10-15 ***American Nuclear Society Winter Meeting*** (Hilton Hotel, San Francisco, California).
Contact: ANS Meetings Department; 708-352-6611.

1992

April 12-16 ***8th Pacific Basin Conference*** (Taipei, Taiwan).
Sponsored by the Amercian Nuclear Society.
Contact: ANS Meetings Department; 708-352-6611.

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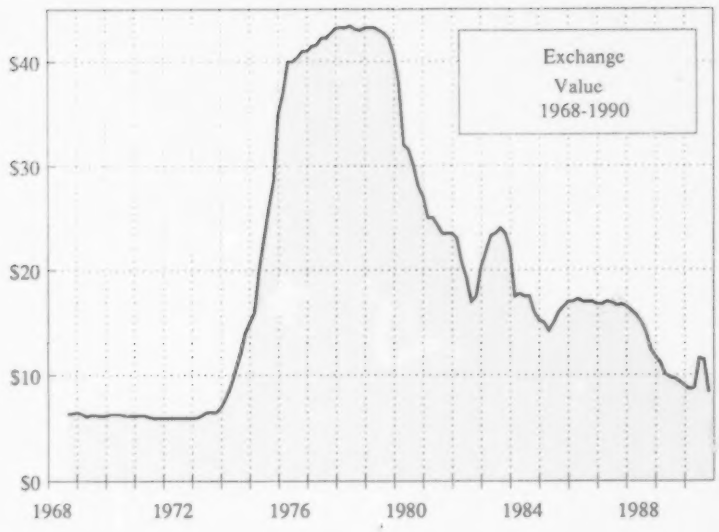
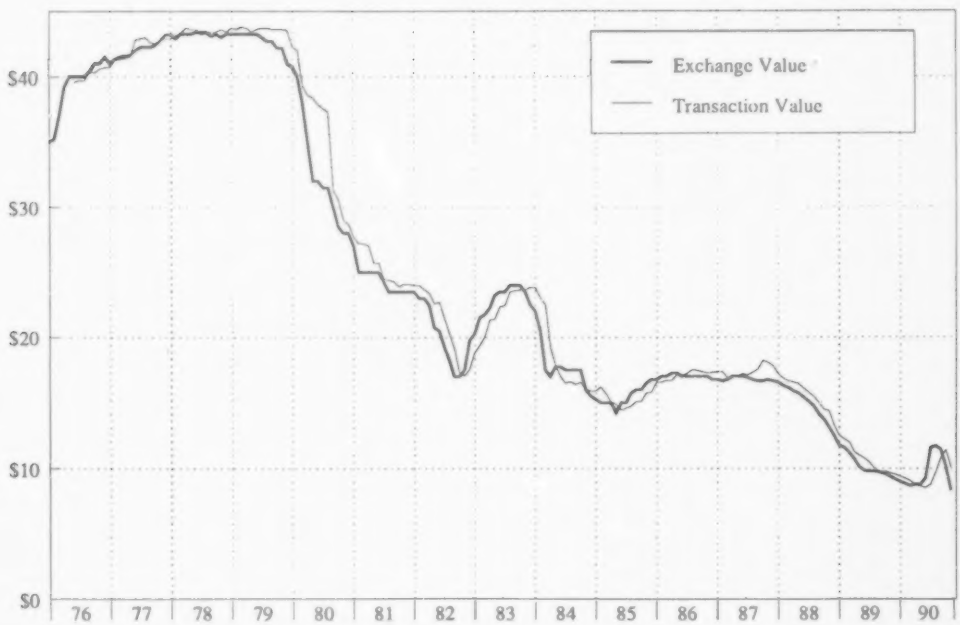
NUEXCO Historical Exchange Value and Transaction Value
(In US Dollars per Pound Equivalent U_3O_8)





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HISTORICAL MARKET DATA

HISTORICAL MARKET VALUES

EXCHANGE VALUES

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	17.50	17.00	17.75	17.75	17.50	17.50	17.50	17.50	16.00	15.50	15.25
1985	15.00	15.00	15.00	14.25	15.00	15.00	15.75	16.00	16.00	16.50	16.75	17.00
1986	17.00	17.00	17.25	17.25	17.00	17.00	17.00	17.00	17.00	17.00	16.75	16.75
1987	16.65	16.75	17.00	17.00	17.00	16.90	16.75	16.65	16.65	16.75	16.65	16.55
1988	16.30	16.15	15.90	15.75	15.40	15.10	14.75	14.15	13.75	13.15	12.50	11.75
1989	11.60	11.20	10.70	10.10	9.85	9.80	9.80	9.70	9.60	9.40	9.20	9.00
1990	8.85	8.70	8.80	8.80	9.25	11.60	11.70	11.45	10.10	**8.35**		

US PREMIUM (Relative to the Exchange Value)

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	0.65	0.75
1987	0.85	1.00	1.50	1.50	0.90	0.60	2.50	2.35	2.10	1.65	0.85	0.65
1988	0.70	0.50	0.15	0.25	0.60	0.00	0.00	0.00	0.00	0.00	**Discontinued**	

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UF6 VALUES

Determined as of the last day of the month indicated ($US/kg U as UF_6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1985	—	—	—	40.50	42.50	42.50	44.00	44.50	44.50	46.00	46.00	47.00
1986	47.00	48.00	48.00	48.50	48.25	48.25	48.25	48.00	48.00	48.00	48.00	47.75
1987	47.75	48.00	48.00	48.00	47.75	47.75	47.50	47.00	46.75	47.00	47.00	47.00
1988	46.50	46.00	45.50	45.25	44.75	44.00	42.75	41.00	40.75	39.00	37.50	35.50
1989	34.75	34.00	33.00	30.50	30.25	30.25	30.00	29.75	29.75	28.25	27.75	26.50
1990	25.90	25.25	24.40	24.40	25.50	32.50	32.50	32.25	29.50	**24.75**		

US UF6 PREMIUM (Relative to the UF6 Value)

Determined as of the last day of the month indicated ($US/kg U as UF_6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	2.50	2.50
1987	2.50	2.50	3.50	3.00	2.25	1.75	6.50	6.00	4.25	3.10	2.25	2.00
1988	1.25	1.25	0.50	0.50	1.00	0.00	0.00	0.00	0.00	0.00	**Discontinued**	

TRANSACTION VALUES

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	22.50	19.25	17.90	17.00	16.50	16.60	16.40	16.55	16.05	15.90	15.90
1985	16.20	15.70	15.05	14.90	14.45	14.60	14.75	15.10	15.10	15.75	15.80	16.55
1986	16.55	16.70	16.70	17.10	17.15	17.20	17.50	17.45	17.35	17.25	17.30	17.35
1987	17.35	16.90	16.95	17.00	17.20	17.10	17.30	17.55	18.20	18.05	17.80	17.20
1988	16.85	16.65	16.55	16.45	16.10	15.80	15.45	15.00	14.50	14.40	13.30	12.50
1989	12.25	12.00	11.25	11.00	10.75	10.45	9.95	9.80	9.80	9.65	9.55	9.40
1990	9.25	9.05	8.75	8.65	8.55	8.80	9.75	10.80	11.40	**10.10**		

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HISTORICAL MARKET DATA

LOAN RATES

Determined as of the last day of the month indicated (Percent per Annum)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	4.00	4.00	4.00	4.00	4.00
1969	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00
1970	6.00	6.20	6.40	6.50	6.50	6.50	6.50	5.00	6.50	6.00	5.50	5.50
1971	5.00	4.75	4.75	4.75	5.00	5.25	5.25	5.25	5.25	5.25	4.50	4.50
1972	4.00	4.00	4.00	4.50	4.50	4.50	5.00	5.00	5.00	5.00	5.00	5.00
1973	5.50	5.50	5.75	5.75	6.00	6.25	7.00	7.00	7.00	7.00	7.50	8.00
1974	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1975	8.00	7.00	7.00	7.00	7.00	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1976	6.50	6.50	6.50	6.50	*	*	*	*	*	*	*	*
1977	*	*	*	*	6.50	6.50	6.50	6.75	7.25	7.25	7.25	7.25
1978	7.25	7.00	7.00	7.00	7.00	7.50	7.75	7.75	7.75	7.00	7.00	7.00
1979	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1980	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1981	7.00	7.00	7.00	7.00	7.00	5.50	5.50	5.50	5.50	6.00	6.00	6.00
1982	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1983	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1984	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1985	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1986	5.00	5.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1987	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	3.50	3.50
1988	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1989	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1990	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	**3.50**		

* Float with Prime Rate

CONVERSION VALUES

Determined as of the last day of the month indicated ($US/lb U as UF_6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	0.30	0.80	0.80	0.80	0.00	0.00	0.80	1.00	1.00	0.80	0.80
1985	1.00	1.00	1.00	1.50	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1986	1.60	1.80	1.90	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.80	1.80
1987	1.80	1.80	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.90	1.90	1.90
1988	1.90	1.80	1.80	1.80	1.80	1.80	1.85	1.95	1.95	1.95	1.95	1.95
1989	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90	1.80	1.75	1.65
1990	1.50	1.50	1.45	1.45	1.45	1.45	1.45	1.45	1.45	**1.45**		

SWU VALUES

Determined as of the last day of the month indicated ($US per SWU)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	80	80	80	80	75	78	78	78	78	78	80	80
1987	80	80	77	77	75	73	75	75	73	69	73	73
1988	73	73	70	68	68	68	68	65	65	65	65	65
1989	65	67	67	67	66	66	66	65	63	59	57	54
1990	54	50	50	50	50	50	50	50	50	**51**		

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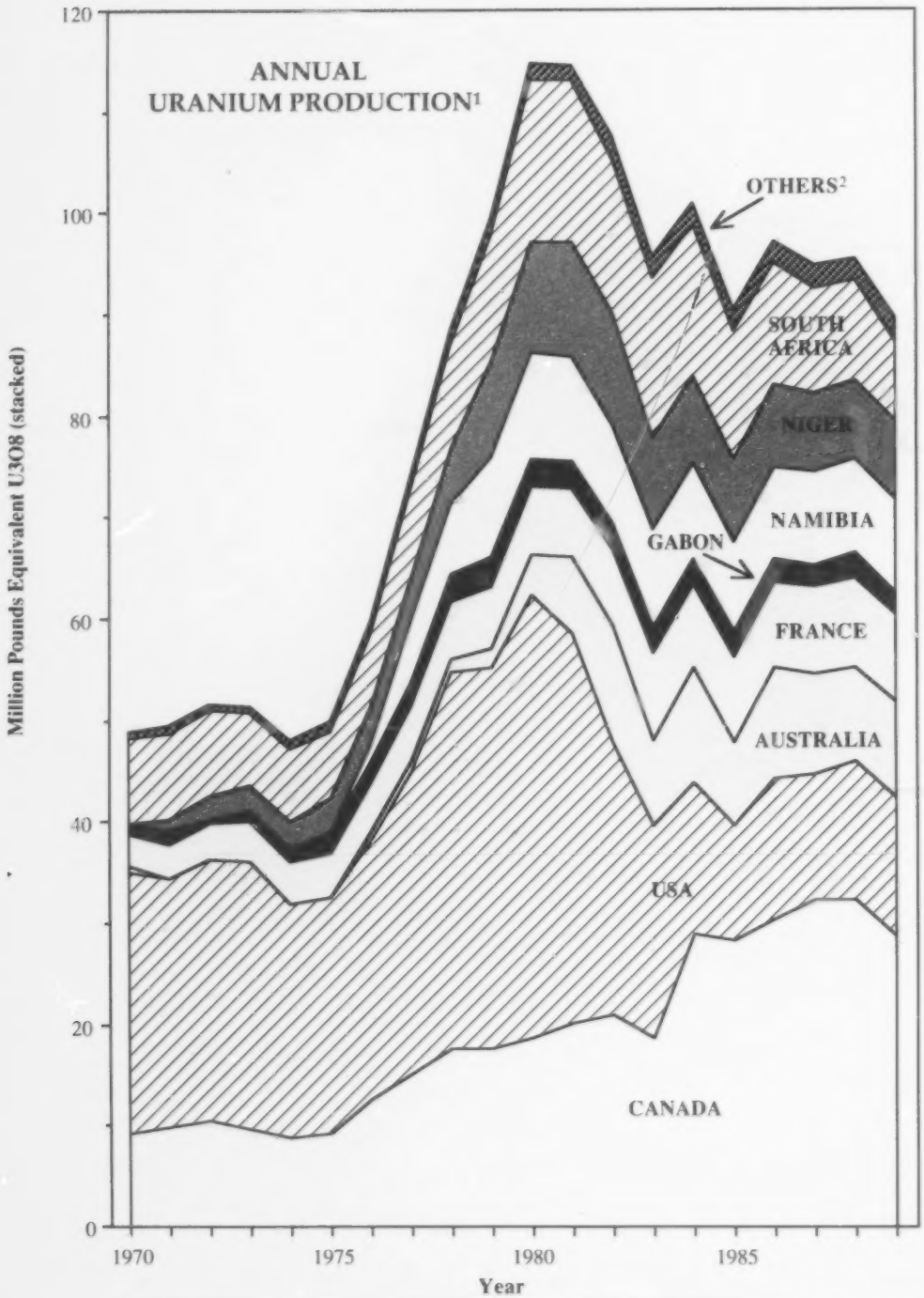

[1] Estimated world production in 1989 totalled 89.6 million pounds (Australia—9.5; Canada—28.7; France—8.5; Gabon—2.2; Namibia—9.2; Niger—7.7; South Africa—7.7; USA—13.7; Others[2]—2.3).

[2] **Others** includes: Argentina, Belgium, Brazil, India, Pakistan, Portugal, Spain, West Germany and Yugoslavia

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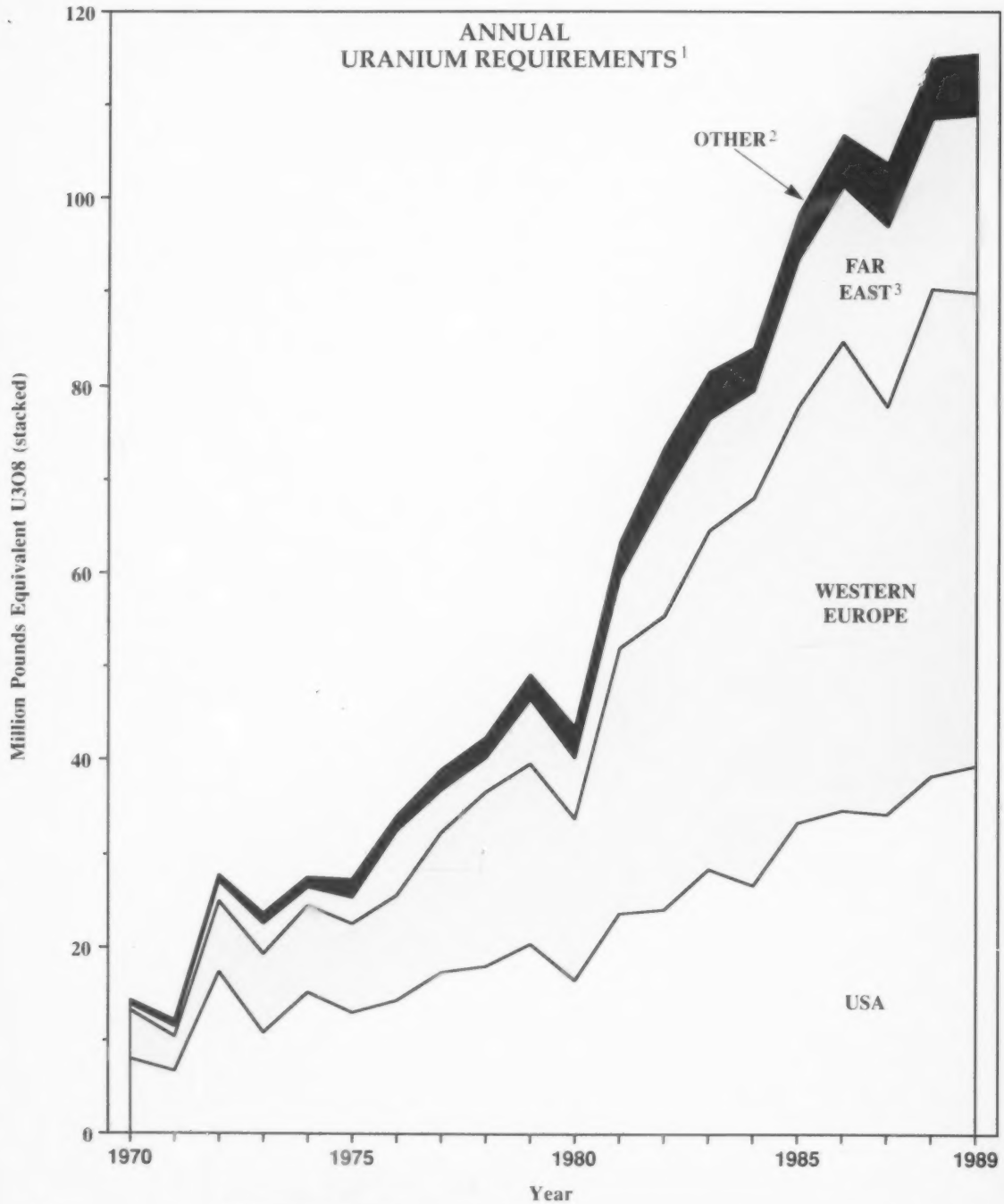
HISTORICAL MARKET DATA



[1] Calculated by NUEXCO based on actual completion dates and operating performance, and NUEXCO's estimate of enriching tails assays.

[2] **Other** include: Argentina, Brazil, Canada, India, Mexico, Pakistan and South Africa.

[3] Does not include Peoples Republic of China.

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AUSTRALIA

Year	Period [1]	Consumer Price Index [2] (1980/1981 = 100)	Price Index of Materials Used in Manufacturing Industry — All Groups [3] (1984/1985 = 100)	Average Weekly Ordinary Time Earnings — Adult Males — Australia [4] (Australian dollars)	Award Rates of Pay Indexes Australia - Adult Males In Mining Wage Earners, Weekly Rates [5] (June 1985=100)
1980	Avg.	95.8	83.1	—	140.8[6]
1981	Avg.	105.0	85.9	—	154.1[6]
1982	Avg.	116.7	89.0	—	174.9[6]
1983	Avg.	128.5	96.9	—	181.9[6]
1984	Avg.	133.6	98.0	—	194.4[6]
1985	Avg.	142.6	107.3	—	103.7
1986	Avg.	155.5	101.5	—	106.1
1987	Avg.	168.7	108.9	465.88	112.3
1988	Avg.	180.9	111.8	496.90	115.2
1989	Avg.	194.6	117.0	534.65	126.0
Jan	1990	—	119.2	—	128.0
Feb	1990	—	120.8	—	128.0
Mar	1990	204.1	121.5	—	128.2
Apr	1990	—	119.9	—	128.5
May	1990	—	118.9	—	128.7
June	1990	—	116.6	—	—
July	1990	—	116.4	—	—

P = Preliminary **R** = Revised since last month

[1] Monthly data for the period 1967 to 1986 appears in Report 233 (January 1988).
[2] Weighted average of six State capital cities (1975 to 1980), and eight capital cities from 1981 (Base: Financial year July 1980 to June 1981 =100.0). Figures shown at end of quarter represent quarterly average.
[3] Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0).
[4] Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0). Figures for the latest fourteen months shown are subject to revision.
[5] Australian Bureau of Statistics, Canberra: "Average Weekly Earnings, States & Australia" (Catalogue No. 6302.0).
[6] Base: June 1976 = 100.

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GOVERNMENT STATISTICS

CANADA

		Industrial Products Price Index: All Commodities [1] (1986 = 100) [2]	Consumer Price Index: All Items (1986 = 100) [3]	Wage-earner Data: Average Hourly Earnings (C$) [4] Uranium Mines (SIC 057)	Metal Mines (SIC 051-059)	Mines, Quarries and Oil Wells (SIC 051-099)	Metal Rolling, Casting and Extruding (SIC 298)	Chemicals and Chemical Products Industries (SIC 372-379)
1980	Avg.	75.7	67.1	—	—	—	—	—
1981	Avg.	83.4	75.5	—	—	—	—	—
1982	Avg.	89.0	83.7	—	—	—	—	—
1983	Avg.	92.1	88.5	17.22	—	14.18	10.67	11.10
1984	Avg.	96.3	92.3	17.89	—	14.97	11.11	11.68
1985	Avg.	99.0	96.0	18.53	16.48	15.56	11.85	12.12
1986	Avg.	100.0	100.0	19.38	16.70	15.76	12.28	12.58
1987	Avg.	102.4	104.4	20.12	17.15	16.11	12.58	13.20
1988	Avg.	106.9	108.6	20.91	18.51	16.95	13.17	13.77
1989	Avg.	109.4	114.0	21.97	20.02	18.41	13.71	14.16
Jan	1990	108.7	116.9	21.88	20.39	19.03	13.99	14.78
Feb	1990	109.3	117.6	22.51	20.63	19.14	14.49	15.03
Mar	1990	109.2	118.0	22.52	20.75	19.17	14.99	15.07
Apr	1990	109.1	118.1	23.17	21.20	19.46	14.83	14.93
May	1990	109.5	118.7	23.28	20.55	19.01	14.71	15.06
June	1990	109.4	119.2	21.85	20.63	18.96	14.69	15.05
July	1990	109.1	119.8	20.92R	20.18R	18.66R	14.34R	15.20
Aug	1990	109.2	119.8	23.87P	20.38P	18.85P	14.53P	15.34P
Sept	1990	109.9	120.2	—	—	—	—	—

P = Preliminary R = Revised since last month

[1] Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011). Indexes for the most recent six months shown are subject to revision. This category was formerly known as "Manufacturing." Monthly data for the period 1967 to 1986 is found in Report 233.

[2] New Base Year of 1986 as of Report 266. Previous Base Year was 1981. All figures in column recalculated by 0.791 multiplier.

[3] New Base Year of 1986 as of Report 264. Previous Base Year was 1981. All figures in column recalculated by 0.755 multiplier.

[4] Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours." Monthly data for the period 1983 to 1986 is found in Report 233.

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SOUTH AFRICA

		Average Declared Working Costs per Metric Ton of Gold Ore Milled[1] (Rand)	Tonnage-Weighted Index of Average Working Costs per Metric Ton of Gold Ore Milled[2] (March 1982 = 100)	Consumer Price Index[3] (1985 = 100)	Production Price Index All Groups[4] (1985 = 100)	Total Employment in Mining and Quarrying[5]	Total Salaries and Wages in Mining and Quarrying[5] (1,000 Rand)
							Annual Total[6]
1980	Avg.	35.53	—	51.9	55.2	709,042	2,237,689
1981	Avg.	41.89	—	59.8	62.7	722,918	2,756,928
1982	Avg.	47.25	104.2	68.6	71.4	702,041	3,181,584
1983	Avg.	51.88	115.0	77.1	79.0	700,901	3,563,282
1984	Avg.	58.95	130.3	86.0	85.6	711,511	4,134,390
1985	Avg.	68.76	151.6	100.0	100.0	724,587	4,778,612
1986	Avg.	80.22	177.9	118.6	119.5	756,637	5,767,950
1987	Avg.	95.01	223.1	137.7	136.2	751,864	6,911,395
1988	Avg.	106.69	241.1	155.4	154.1	705,355	7,774,054
1989	Avg.	116.65	273.0	178.2	177.5	700,360	8,833,934
							Monthly Total
Jan	1990	—	—	192.0	188.8	688,837	801,616
Feb	1990	—	—	193.3	190.3	674,026	767,274
Mar	1990	126.74	296.3	196.4	190.9	704,660	780,614
Apr	1990	—	—	198.3	194.1	696,107	810,474
May	1990	—	—	200.4	196.3	613,527	719,191
June	1990	128.25	299.87	201.8	197.0	676,621	841,165
July	1990	—	—	203.2	197.2	—	—
Aug	1990	—	—	206.5	199.8	—	—
Sept	1990	—	—	209.7	—	—	—

P = Preliminary R = Revised since last month

[1]Chamber of Mines of South Africa, Johannesburg: "Analysis of Working Results," published quarterly. Historical Data by month appears in Report 236.

[2]Page 16 of Report 178 contains description and calculation of index, and page 24 of Report 178 lists figures for 1982.

[3]Central Statistical Service, Pretoria: All income groups-weighted average, Historical Data by month appears in Report 236.

[4]Central Statistical Service, Pretoria: All commodities for consumption in South Africa.

[5]Central Statistical Service, Pretoria: Historical Data by month appears in Report 236.

[6]Annual total is shown, rather than monthly average for indicated year.

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GOVERNMENT STATISTICS

UNITED STATES

		Producer Price Index[1]		Consumer Price Index[2]	GNP Implicit Price Deflator[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
		Industrial Commodities (1982 = 100)	All Commodities (1982 = 100)	(1982-1984 = 100)	(1982 = 100)	Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1980	Avg.	88.0	89.8	82.4	85.7	10.26	10.63	8.30	6.94
1981	Avg.	97.4	98.0	90.9	94.0	11.55	11.98	9.12	7.62
1982	Avg.	100.0	100.0	96.5	100.0	12.31	12.93	9.96	8.21
1983	Avg.	101.1	101.3	99.6	103.9	12.58	13.43	10.58	8.67
1984	Avg.	103.3	103.7	103.9	107.7	13.05	13.43	11.07	9.04
1985	Avg.	103.7	103.2	107.6	110.9	13.38	13.74	11.56	9.46
1986	Avg.	100.0	100.2	109.6	113.9	12.46	13.48	11.98	9.65
1987	Avg.	102.6	102.8	113.6	117.7	12.52	12.98	12.37	9.88
1988	Avg.	106.3	106.9	118.3	121.7	13.24	13.26	12.71	9.79
1989	Avg.	111.6	112.2	124.0	126.6	13.59	13.72	13.09	10.05
Jan	1990	114.1	114.9	127.4	—	13.69	13.95	13.34	10.13
Feb	1990	113.6	114.4	128.0	—	13.70	13.99	13.27	10.16
Mar	1990	113.2	114.2	128.7	129.7	13.80	14.04	13.34	10.17
Apr	1990	113.2	114.1	128.9	—	13.92	14.30	13.53	10.17
May	1990	113.5R	114.6R	129.2	—	13.96	14.16	13.46	10.22
June	1990	113.1	114.2	129.9	130.9	14.00	14.31	13.51	10.27
July	1990	113.2	114.3	130.4	—	14.29R	14.49	13.58R	10.34
Aug	1990	115.9	116.5	131.6	—	14.24P	14.60P	13.55R	10.32R
Sept	1990	118.3	118.3	132.7	132.1	—	—	13.63P	10.42P

P = Preliminary R = Revised since last month

[1]US Bureau of Labor Statistics, Washington, D.C.: "Producer Prices and Price Indexes," (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents. Historical data is presented in Report 233.

[2]US Bureau of Labor Statistics, Washington, D.C.: Consumer Price Index for All Urban Consumers, US City Average, All Items. Historical data is presented in Report 233.

[3]US Department of Commerce, Washington, D.C.: Bureau of Economic Analysis, National Income and Wealth Division: "Survey of Current Business." The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted. Historical data is presented in Report 233.

[4]US Bureau of Labor Statistics, Washington, D.C.: "Employment and Earnings." All data based on 1972 revision of SIC Manual. Historical data is presented in Report 233.

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VOLUME AND PRICE OF URANIUM DELIVERIES TO THE EUROPEAN COMMUNITY[1]
(Compiled from data published by the Euratom Supply Agency)

Year	Volume of Deliveries to the EC[2] (MTU)	Percentage of Deliveries Made Under Spot Contracts	Medium or Long-Term Contracts[3] Average Price		Spot Contracts[3] Average Price	
			in ECU per pound U_3O_8	in US Dollars per pound U_3O_8	in ECU per pound U_3O_8	in US Dollars per pound U_3O_8
1977	n/a	n/a	n/a	n/a	n/a	$41.00
1978	n/a	n/a	n/a	n/a	n/a	$43.00
1979	10,000	n/a	n/a	n/a	n/a	$44.50
1980	8,600	n/a	n/a	$36.00	n/a	$35.00
1981	13,000	less than 10	n/a	$33.25	n/a	$28.00
1982	12,500	less than 10	ECU 32.25	$32.00	ECU 24.25	$24.00
1983	13,500	less than 10	ECU 34.75	$31.00	ECU 26.00	$23.25
1984	11,000	less than 10	ECU 37.75	$29.75	ECU 24.50	$19.25
1985	11,000	11.5	ECU 38.00	$29.00	ECU 19.50	$15.00
1986	12,000	9.5	ECU 31.50	$31.00	ECU 18.00	$17.75
1987	14,000	17.0	ECU 28.25	$32.50	ECU 15.00	$17.25
1988	12,500	4.5	ECU 26.92	$31.82	ECU 13.65	$16.13
1989	13,500	11.5	ECU 26.63	$29.35	ECU 11.04	$12.19

R = Revised

[1] The twelve European Community member nations are Belgium, Denmark, France, West Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, and the United Kingdom; prior to January 1986, Spain and Portugal were not members of the EEC.

[2] The only deliveries taken into account are those made to final users, namely the electric utilities or their procurement organizations; deliveries to middlemen or fuel cycle companies are not included. The sales between utilities in the Community are also excluded. The quantities covered are those which were entered into accounting records during the year stated.

[3] For deliveries made under medium or long-term contracts (i.e., for which the time between the date of signature and the date of the last delivery exceeds one year) the prices were expressed in seven different currencies. In order to calculate an average price, these prices have been converted into European Currency Units (ECU) and US dollars. The average prices were weighted by quantity and converted on the basis of the average annual exchange rate of the different currencies against the ECU and US dollar. Exchange rates are published by European Communities Statistical Office and the International Monetary Fund.

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GOVERNMENT STATISTICS

US URANIUM MARKETING ACTIVITIES STATISTICS
(Compiled from data published by the US Energy Information Administration) [1]

Year	Total Production (million pounds U_3O_8)	Deliveries to Domestic Utilities From US Suppliers[2] (million pounds U_3O_8)	Average Price of Delivered Uranium[2] ($/lb. U_3O_8)	Quantity of Uranium Imported[3] (million pounds U_3O_8)	Average Price of Imported Uranium ($/lb. U_3O_8)	Quantity of Uranium Exported (million pounds U_3O_8)
1976	25.5	27.6	$16.10	3.6	n/a	1.2
1977	29.9	27.8	$19.75	5.6	n/a	4.0
1978	37.0	31.6	$21.60	5.2	n/a	6.8
1979	37.5	33.0	$23.85	3.0	n/a	6.2
1980	43.7	35.0	$28.15	3.6	$43.10	5.8
1981	38.5	32.6	$34.65	6.6	$32.90	4.4
1982	26.9	23.5	$38.37	17.1	$25.19	6.2
1983	21.2	24.2	$38.21	8.2	$26.16	3.3
1984	14.9	22.5	$32.65	12.5	$21.86	2.2
1985	11.3	21.7	$31.43	11.7	$20.08	5.3
1986	13.5	18.9	$30.01	13.5	$20.07	1.6
1987	13.0	20.8	$27.37	14.8	$19.14	1.0
1988	13.1	17.6	$25.65	15.8	$19.03	3.3

[1] Sources: 1976-1983: US Department of Energy/Energy Information Administration, *Survey of United States Marketing Activity*
1984-1988: Energy Information Administration, *Uranium Industry Annual*
[2] Data for 1976-1981 includes both domestic utilities and agents
[3] Includes imports by domestic utilities and domestic suppliers

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